MONOGRAPH

ON

ES AND DYEING IN ASSAM.

BY

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INDIAN CIVIL SERVICE.

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ON the issue of instructions for the preparation of this monograph, steps were taken to collect materials on which requests for information could be based. It was found that the only attempt hitherto made to collect information on the subject for Assam had apparently been made by Mr. H. Z. Darrah in connection with his *Note on Cotton in Assam;* but, inasmuch as the subject of dyeing was merely incidental to the Note in question, the amount of space in it devoted to the dyes used in the province was necessarily small. The list of dyes given by Mr. Darrah was, however, used as a base to start from. Other sources of information were then consulted, more particularly Dr. Watt's *Dictionary of the Economic Products of India* and his *List of Dyes, Tans, and Mordants* (1883), McCann's *Dyes and Tans of Bengal*, Liotard's *Dyes of Indian growth and production*, and Gamble's *Manual of Indian Timbers*, and from them a list of dyes either known or likely to be found in Assam was compiled. This list was then circulated among district officers and others likely to afford information, and they were referred to the accounts already forthcoming of the dyes included in the lists. They were asked to state whether those accounts held good for their districts, and, when they were inaccurate or scanty, to correct or supplement them. They were also asked to describe as fully as possible any dyes not included in my lists. Special efforts were made to secure, as far as possible, scientific accuracy in the descriptions of dyes used. But, owing partly to want of time, and partly to the season being unfavourable to the collection of specimens, and to the defective nature of some of the specimens supplied by district officers, it has been found impossible to get, in time to be included in this monograph, accurate identifications of some of the vegetable dyes used in the province, and it has been necessary to describe them under their vernacular names.

Steps taken in preparation of monograph.

The number of dyes found in Assam is very great, and though comparatively little use is made of them, it has been thought desirable to take the opportunity afforded by the preparation of this monograph to compile a complete list of all the substances found in the province which can be used as dyes. The list has been prepared alphabetically, each dye being entered, where possible, under its scientific name, and, as a means of cross reference, a glossary of the vernacular names of the dyes has been added. All available details of the dyes themselves, and of the methods of their preparation and use, will be found noted against them in the list, and all that is necessary beyond this is to add a few paragraphs containing general information on the subject.

Plan of monograph.

It may be stated at the outset that the dyeing industry has never been an important one in the province, and that it is year by year growing rapidly more unimportant. That form of civilisation which takes the shape of commercial enterprise has never found favour with the Assamese proper; and, though the Assam Valley contains great wealth of dyeing material, no record is in existence of demands having been made upon it to aid in an export trade either of the crude dyes or of manufactured dyed articles. This remark is equally true of the Surma Valley. It is a significant fact that there is no indigenous professional dyeing caste in the province. Of the few persons belonging to professional dyeing castes who were enumerated at the census of 1891, most were foreigners, and the rest were descendants of foreigners. Apparently, there is not, and never has been, any class of people among the indigenous population who devoted themselves solely to the practice of dyeing for their livelihood. Among the plains people, the reason will probably be found in the fact that they indulge very sparingly in the use of coloured raiment. The vast majority of the people, both males and females, are clad with cotton, or silk of natural colours. It may be said that, generally speaking, the people in the Surma Valley wear cotton, and the inhabitants of the Assam Valley silk. In Goalpara and the lower portion of Kamrup an intermediate stage is found, where silk and cotton enjoy more or less equal popularity. By silk is meant, of course, the home-made product from the *muga* and *eri* silkworms. Silk garments are rarely dyed, but they are frequently adorned by the addition of an ornamental border. These borders are sometimes woven in one piece with the garment, and sometimes woven separately and tacked on. They vary considerably in design, but the majority consist of squares, diamonds, and straight lines, with minor embellishments worked in. Occasionally, flowery designs are attempted with very considerable success. No two borders worked by different women are, as a rule, exactly alike, though it is of course found that different localities affect particular designs, of which the general arrangement is the same. It is, practically, solely in the manufacture of these borders that the ordinary plains population resort to dyeing at all, and for this purpose the thread is dyed first and used in its dyed state. The women of the better classes sometimes kill their leisure time by embroidering fancy designs in colours on handkerchiefs and *chaddars*, and for this purpose also the thread is dyed first. The demand for dyed articles among the classes forming the main body of the population being thus very limited, no inducement exists for persons to take up dyeing as a means of livelihood; for vegetable dyes, yielding all the colours they require, are found in abundance near every household, and the accessories used in the dyeing processes are of the most homely description. Again, bordered cloths are not used by the ordinary raiyat for everyday wear; and, as they are very strong and durable, and last for years, the necessity for making them does not arise very frequently. When it does, a quantity of the dye stuff, just sufficient to meet immediate requirements, is prepared and used forthwith.

Dyeing industry unimportant in Assam.

Majority of plains population do not wear colours.

Demand for dyed articles thus very limited.

When required they are prepared simply and inexpensively at home.

It would, perhaps, be more correct to say that the above remarks apply more particularly to the last generation and to the older members of the present generation. The tendency at the present day is to shirk the trouble necessary

to prepare the dye stuff, and to buy the thread ready coloured from the Marwari and Dacca merchants in the bazars. The thread so purchased is usually of foreign, generally of British, manufacture, and is dyed by aniline dyes. The colours are more gaudy and brilliant than the home-made ones, and, if they are less permanent, the loss is considered to be counterbalanced by the saving of trouble. They are cheap, too, and, the quantity of coloured thread required being small, the probability of even so much of a dyeing industry as now exists ceasing altogether is considerable. It may be mentioned that there seems to be a tendency amongst the women nowadays to adopt coloured, short jackets in addition to their traditional garb; but these garments are generally made of cheap satin bought in the bazars, and manufactured out of India, so no impetus is given by this fashion either to the dyeing industry.

This practice, too, is giving way before imported thread.

Under these circumstances, it will be readily understood that the work of collecting information from the plains districts for this monograph has not been unattended with difficulties. The answer to enquiries from natives was much the same everywhere—"that one should ask some one older than the person addressed; yes, no doubt there were lots of dyes to be had, but people had forgotten them and how to use them nowadays,—it was so much simpler to get things in the bazar." The reply is typical of the state of the dyeing industry in the province at the present day, and accurately sums up both its history and its present position. Dyeing has never been more than an ordinary domestic accomplishment in Assam, and nowadays it is falling out of the average curriculum. The following extracts from the reports received from the various districts contain practically the whole of the general information on dyeing in Assam available at the present day:

Extracts from district reports

From Cachar.—" * * The *Manipuris* in this district do not, as a rule, colour yarns, but buy all dyed yarns they use from the markets. They sometimes buy European piece-goods and colour them before using. Printed piece-goods are not manufactured in this district." (Then follows a list of dyeing materials used by *hill* tribes in the district.) " * * There is no trade of dyeing carried on to any extent in this subdivision (Hailakandi), except that the Manipuris dye their cloths in some very simple ways." "The Manipuris * * often procure their principal ingredients from Manipur." Dyeing in Cachar appears from these accounts to be confined to the Manipuri and hill-tribe immigrants settled in the district.

From Sylhet.—"The weavers (*Tántis* and *Yogis*) occasionally make plain coarse cloths from imported yarns. * * * Coloured borders are rarely worked into these cloths; but, when worked, they are woven with dyed yarns imported into the district. The Manipuris, of whom the population in the district according to the last census is over 30,000, carry on weaving on a comparatively larger scale. Yarns and cloths are sometimes dyed by them in different colours." (Then follows a list of dyes *used by the Manipuris.*) "* * * There are three Muhammadans from Gorakhpur in the town of Sylhet who carry on the business of printing cloths. But both the cloths and the dyes with which they are printed are imported articles. Their charge for printing per yard is six pies for black or yellow, and three pies for rose or red." In another report, after commenting on the lack of information from the subdivisions of the district, the writer says "as a rule, the people of Sylhet know

very little of dye stuffs and dyeing. Hindus seldom use dyed cloths. The Mussalmans, male and female, do use dyed cloths, but the practice is confined mostly to the lower classes, who usually prefer the colours blue and black. Tea-garden coolies and time-expired coolies who have settled down in the district use dyed cloths extensively; neither the Mussalmans nor the coolies, however, dye their own cloths. There are professional cloth-dyers now in Sylhet town, men from the North-West Provinces, who dye cotton fabrics, and are doing a profitable business. There are also some dyers here from the Nuddea district, who dye shawls and all sorts of warm clothing. Both these classes of dyers use largely aniline dyes, supplemented by a few indigenous dye stuffs, producing black, blue-black, and ash colours, but the processes employed are considered trade secrets. It will thus be seen that the use of aniline dyes is known in this district, and the practice has, it seems, been slowly but steadily increasing. The Manipuris here are good dyers, and they are much addicted to the use of dyed cloths." These accounts show that in Sylhet, as in Cachar, dyeing is practically an unknown art among the indigenous population.

From Goalpara.—"The dyeing industry is altogether unknown in the sadr subdivision." Another account describes the "dyes prepared and used by the *Rajbangshis* and *Meches* of this district. The dyes they use are few in number."

From Kamrup.—"Cotton yarns and piece-goods are seldom dyed red, as red imported yarn is cheaper and easily procurable in the bazars." "There were formerly professional *Tantis* (weavers) in some parts of the district; but, since the importation of cheap dyed yarns and piece-goods from Manchester, the professional *Tantis* have given up their profession as not being lucrative, and their descendants have taken to agriculture, and are now ignorant as to how their ancestors used to dye in different colours." Another account refers to the dyes "used by the *Cacharis* in the district."

From Sibsagar.—"In former days the aboriginal tribes and some classes of the Assamese proper used to prepare dyes for colouring cloths and other articles, but the practice has for a long time been gradually becoming more and more rare. The *Miris* have almost entirely given up dyeing. The *Noras* and *Turungs* still continue to practise it to some extent."

From Lakhimpur.—"This district, especially the sadr subdivision, furnishes very poor material on this subject. Almost all the people use dyed yarns, which they get from the Kayas' shops, and which are imported from Bengal. Very few people, and those chiefly of the poorer classes, resort to home-made dyes. Wool is quite unknown here, and of the silks, only *eria* is dyed, and that rarely. Cotton articles are sometimes dyed, but the custom is dying out, as the fine Calcutta articles have taken their place. In some parts of the district, however, the home-made, coarsely-dyed yarns are preferred to the fine and well-coloured Calcutta threads which are sold at the Kayas' shops, but the merchants of Calcutta are now manufacturing coarse and badly-coloured threads for importation into Assam, to compete with the home-made articles. The practice of dye-printing is altogether unknown in this district." Another report says: "The practice of dyeing is not extensive in this district. It is only the *Phakials*, *Khamtis*, and *Mataks* that prepare dyes of their own. The practice is now dying out, and is being gradually abandoned, as the home dyeing is troublesome and expensive, and the colours obtained by it are inferior in colour and lustre to those of the imported articles."

The reports might no doubt have been much fuller; but to obtain more information would have entailed a very laborious enquiry, which would have occupied more time than the officers consulted were, probably, able to give to the subject. The above extracts, however, sufficiently indicate how little the *ordinary* population of the plains districts make use of the natural dyes which abound in their neighbourhood. It will be noticed that in nearly every case the practice of dyeing is referred to as being resorted to by small tribes like the Manipuris in the Surma Valley, and the Meches, Cacharis, Noras, Turungs, Khamtis, and Phakials in the Assam Valley. These tribes keep very much to themselves: they have languages and customs of their own, separate from those of the general population among whom they live, and they appear to have preserved, among their other customs, that of dyeing their own cloths. Many of the accounts received, *e.g.*, that from Goalpara, specifically state that the descriptions of the dyes included in them apply only to one or more of these small and scattered communities; in other accounts, it can be inferred from the context that the descriptions of the use of the dyes named in them have a similarly limited application.

Extracts show that dyeing is confined chiefly to small and scattered tribal communities distinct from general population

This keeping up of dyeing customs among these tribes is of great ethnological interest. The Manipuris in Cachar and Sylhet wear exactly the same coloured cloths as their compatriots in Manipur itself; the number of shades produced is not great, and the same recipes are apparently handed down from generation to generation with such fidelity that a very casual acquaintance with the colours used in Manipur itself suffices to enable one to identify at a glance the different shades seen in Cachar and Sylhet as Manipuri. Similarly with the Phakials and Khamtis in the Lakhimpur district, and the Singphos on its borders. Captain Hannay, in his *Notes on the Shans* published in 1848, wrote of the Phaké or Phakials:

Ethnological interest of this fact.

" * * This branch of the Shans is conspicuous above others of the nation in Assam for their coarse cotton manufactures, which they have the art of dyeing into good permanent blue and cheque patterns in demand by the Nagas as well as the Dhoanneahs[1] in the neighbourhood; so much of their time and attention, indeed, is taken up in this branch of industry, that it is frequently a cause of failure in their means of subsistence, as grain is not at present to be purchased during the rains. The Phaké have also succeeded in dyeing the *moonga* silk thread into several fast colours, with which they fabricate very pretty imitations of the check silk *patsoes* worn by their eastern brethren. The black dye given to the cotton both in the piece and in the thread is good, and stands well. It is obtained by frequent immersions in a bath of the common indigo and also in that of the *rom*[2] of Assam; but I think, to make so deep a colour, they must add also the black obtained by boiling the fruit of the *hiltkha* (or *Terminalia citrina*) in an iron pan. I have not been able to obtain so good a black to the *moonga* thread, but it is quite possible that this could be given to clean white silk, as the natural varnish which seems to cover the former is against the brightening of any colour but light blue, a red lilac, and olive yellow. Their dye stuffs are—

Lac dye.	Mishmi teeta (yellow) (*Coptis teeta*).
Munjeet (*Mungestia*).	Khai khan (greenish yellow).
Arnotto (*Bixina*).	Assookhat (brownish yellow).

" The weaving of the cloth of every kind, as well as the process of dyeing, is carried on by the females, and all are engaged, from the Gohain's family to the poorest in the

[1] "From the intercourse of the Singphos with their Assamese female slaves, a mongrel race has sprung up, well known in Upper Assam under the denomination 'Duaniahs.'" (*Dalton's Ethnology of Bengal.*)

[2] It is doubtful if the true indigo was used. The *rom* referred to is *Strobilanthes flaccidifolius*.

village. The weaving-looms are of the same description as those in use with the Assamese for the larger cloths, but the loom used for all narrow silk and coarse cotton (cheque pattern) clothes is that in use with the Manipuris and Singphos."

Of the Singphos, Major Hannay wrote—

"The cloth manufactured by the Singphos is of a coarse, but strong, texture. The cotton, of their own produce, is prepared by the females; and, as they are fond of chequed patterns, the thread is dyed previous to being woven. The colours given are Indian red, brown, buff, and various shades of green and blue. Their dyes are *rom*, a kind of indigo, *seing loung*, or *assookhat*, and the root of a creeper, *khai khien* of the Shans, of a bright yellow. In the art of dyeing, however, they are not so expert as the Shans, and amongst the Kakhyens, I fancy, they do not succeed beyond a deep blue from *rom*, and a reddish brown from the *assookhat*."

These accounts, written nearly 50 years ago, a period in which the province and people have undergone very rapid development, hold good at the present time. The two or three small Phakial villages near Jaipur still make very handsome cheque-patterned cloths, which find a ready sale among the Europeans in the district. The Noras and Turungs in the Jorhat subdivision, also of Shan descent, are much less expert dyers, and produce only enough to satisfy their own domestic requirements. Their productions, however, are not unlike those of the Phakials, and are certainly characteristically different from the cloths used by the Assamese around them.

Dyeing more common in hill districts.

So far, my remarks have been confined chiefly to the plains districts, in which it has been shown that dyeing is confined practically to small tribes who are either relics of former inhabitants or immigrant settlers from the neighbouring hill tracts, and is carried on by them only for home consumption. Turning now to the hill districts, we find, as might have been expected, that dyeing is much more common among the hill tribes. The wearing of white or fawn-coloured cloths is as much the exception in the hills as it is the rule in the plains. All the tribes in the hills surrounding the province affect coloured raiment, of which the dominant colour is usually either black or dark blue, or red. Most tribes have distinctive fashions in the arrangement of the colours, so that to the initiated a hillman's cloth is a sure index to the tribe or clan to which he belongs. Some of the Naga tribes in particular are very expert dyers, and produce extremely brilliant and handsome colours. Strangely enough, they are said not to use the madder, which grows abundantly in their hills, to dye their cloths; it appears to be used only to dye cane (for use in making Naga ornaments) and goat's hair, etc. (for the ornamentation of spears and for other personal decorations). It is said, however, that dyeing is not an art known to all Nagas; in fact, some villages do not dye at all, but purchase dyed articles or get their cloths dyed in certain other villages. It might have been thought that the home-made articles would have sufficed for the still semi-savage Nagas for many years to come, but the Deputy Commissioner reports that Berlin wool and cheap bazar-bought thread are fast superseding them.

Dyeing in Manipur.

Manipur has been left to be noticed last, because it can scarcely be called a plains district, and yet is not strictly a hill district. But, though mentioned last, it is by no means the least important from a dyeing point of view. The Manipuris have long been known as skilful and artistic dyers, and they still maintain their reputation in this respect; indeed, they are probably much better dyers than any class of people on this side of India. Specimen cloths dyed by them

have been sent me, which, for richness of colour and delicacy of shade, would put to shame most of the cheap and gaudy European piece-goods that find their way to Assamese markets. The late Major Trotter, when Political Agent at Manipur, made very careful enquiries into the subject, and recorded an interesting account of the processes followed and materials used by the Manipuris. This account, together with additional information procured in connection with this monograph, has been incorporated below under the headings of the various dyes used; but it may be stated here, on the authority of Dr. Geo. Watt, that, until Major Trotter made known the result of his enquiries, some of the plants mentioned by him as yielding dyes to the Manipuris were not previously known to yield dyes at all, while one or two of them were absolutely new to science. Dyed cloths are a regular article of commerce in Manipur, and a portion of the daily market held outside the *Pát* in Imphal is devoted to their sale. The Nagas are regular customers for these cloths, and the Deputy Commissioner of the Naga Hills states that for many years past Manipur has supplied most of the brilliant coloured cotton for making up cloths in his district.

Commercial aspect of dyeing in Assam

From a commercial point of view, the subject of dyes and dyeing in Assam is, as will be gathered from what has been said, of absolute unimportance at present, nor does there appear much likelihood, under present conditions, of the industry reviving. Some years ago a lac-dye factory was established at Gauhati, in the Kamrup district, but as the market value of this particular dye rapidly decreased in consequence of cheaper substances being discovered to serve the same purpose, the factory was closed.

Unimportant at present,

The instances in which the industry now gives rise to commercial transactions are few and unimportant. The trade in Manipur has already been referred to. To this may be added that the hill tribes bring down madder and barter or sell it to the plains people. There is also a certain amount of madder and lac brought down by the Bhutias for export to Calcutta. The following figures, showing the imports of madder and lac into Assam, are taken from the last Provincial Triennial Report on the Foreign Trade of Assam:

Dye, and whence imported.	1893-94.		1894-95.		1895-96.	
	Quantity.	Value.	Quantity	Value.	Quantity.	Value.
	Mds.	Rs.	Mds.	Rs	Mds.	Rs.
Madder—						
From Bhutan	45	688	57	360	51	195
From Towang	5	30	1	3	6	32
Lac—						
From Bhutan	329	5,193	377	9,663	1,404	17,941
From Towang	3	35	3	23	30	306

No figures are forthcoming to show the exact amount of madder and lac exported from the province, but it is believed that the greater portion of the above imports are exported. Beyond these instances, there is nothing to be recorded but cases of petty and intermittent sales or barter among villagers, who are generally neighbours, and with whom such transactions are ordinarily in the nature of mutual assistance. Should, however, any demand for dye stuffs come from outside

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the province, there is practically no limit to the supply available, if only the labour could be found to collect it.

e.g., madder.

Madder is perhaps the best example that can be instanced of the potential value to the province of its wealth in dye stuffs. The remarks under *Rubia* in the list below discuss the subject at length. The present position may, however, be briefly summed up here, and it is this: Indian madder has been rejected commercially as being inferior to European madder. Dr. Watt conjectures that this may be owing to the fact that there are several species of madder found in India, and that the specimens subjected to examination, with a view to comparing their dye-yielding properties with those of the European species, were not the best that could have been selected. Much confusion has undoubtedly existed in the past in the differentiation of the species of *Rubia*, and Dr. Watt has done much towards clearing it up by his contributions on the subject. He discovered that there are two varieties of the species of *Rubia* known as *cordifolia*, and that one of them, which he called *Rubia khasiana*, was much the richer of the two in madder dye principle, and was, indeed, in his opinion, not inferior in this respect to the European variety. Steps were taken last year to send a quantity of *Rubia khasiana* to England with a view to its being chemically analysed at the Imperial Institute; the result of the analysis is not yet known, but, should it confirm Dr. Watt's opinion, there may be an export trade in madder from Assam before long. The creeper grows wild at present, but with cultivation the supply could no doubt be increased indefinitely. The principal difficulty to be overcome would be the labour-supply necessary to work the industry on a paying scale, but this could no doubt be removed.

Aniline dyes.

A few remarks on the subject of the use of aniline dyes in Assam may be added. Some eight or nine years ago, enquiries were instituted at the instance of the Government of India to ascertain to what extent the use of aniline dyes prevailed in the province. It was then reported from all districts but Sylhet that their use was quite unknown. In Sylhet their use was said to be extremely limited. Almost the same may be said of the present day. There are a few more professional up-country dyers in Sylhet than there were when enquiries were made before, and magenta is said to be used occasionally in Goalpara; otherwise the use of aniline dyes is still unknown in Assam.

LIST OF DYES FOUND IN ASSAM, WITH DESCRIPTIONS OF THEIR USE.

ACACIA CATECHU.—*Willd.; Fl Br Ind., II,* 265; *Roxb., Cor. Pl., t.* 175.

CUTCH, OR CATECHU

Beng.—Khayer, or Kuth.

Ass.—Khoira, or Khoir.

Common in most plains districts in Assam. *Darrah,* in his "Note on Cotton in Assam," mentions that with lime or alum this tree gives a dull red; but no information has been received to show that its use as a dye is known in any of the districts in the province. The gum extracted from the tree is often mixed with the lime used in chewing betel-nut, to lessen the sharpness of the taste of the lime.

ACACIA CONCINNA.—*D. C.; Fl. Br. Ind., II, p.* 296.

THE SOAP ACACIA.

Beng.—Ban-ritha.

"A common, prickly, scandent bush, common in the tropical jungles throughout India" (*Watt*). Common in most plains districts in Assam, but its use for dyeing and tanning purposes is unknown in the province.

ACACIA FARNESIANA.—*Willd.; Fl. Br. Ind., II,* 292; *Wight, Ic., t.* 300.

THE CASSIE FLOWER.

Beng.—Guyá babulá

"No information has been received on the subject of this small tree. It is probable, however, that it exists in the Surma Valley districts, though its use in dyeing is said to be unknown there. It is known to exist in a more or less wild state in the neighbouring district of Dacca, where "the bark, mixed with salts of iron, gives an inky dye, moderately permanent; the bark is also used in tanning in the Dacca district" (*McCann*).

ACANTHACEÆ (*a species of*).—*cxxii, Gen. Pl.*

Manipuri—Khujum pereh.

A shrub known to exist in Manipur only. For its use, see the account given under "*Carthamus tinctorius.*"

ACHYRANTHES ASPERA.—*Linn.*

THE PRICKLY CHAFF-FLOWER.

Beng.—Apang.

Ass.—Apang.

This shrub, the ashes of which are used as an alkali in dyeing in other parts of India, is known to exist in some parts of Assam, but no information is available as to the extent to which it is used for dyeing purposes in this province.

ADENANTHERA PAVONINA.—*Linn.; Fl. Br. Ind., II*, 287; *Wight, Ill., t.* 84 (80).

RED WOOD (SOMETIMES CALLED RED SANDAL WOOD).

Beng.—Rakta chandan.

Ass.—Chandan, Ratul chandan (Darrang).

A large deciduous tree. It is reported to be found at the Brahmachari Satra in Nowgong and to furnish a red dye. It is also reported as growing in the Kamrup, Darrang, and Goalpara districts, but is not used for dyeing purposes.

ADHATODA VASICA.—*Nees; Fl. Br. Ind.; IV.*, 109. Syn.=*Justicia adhatoda (Linn.).*

Beng.—Bâsak

Ass.—Bâhak.

A small sub-herbaceous shrub, often gregarious, found all over the province, but not used as a dye anywhere. It gives "a yellow dye obtained from the leaves by boiling." "It gives a greenish blue when combined with indigo. This property is not apparently known to the Nagas, who cultivate the plant to shade the approaches to their villages. I repeatedly asked if [illegible] and was, [illegible] a dye from it, and was told that they did not, but that the principle, [illegible] European variety. Steps were taken last year to send a quantity, but that they used the stem for divining" (*Watt*). Both the leaves and the roots of the plant are used extensively in the Assam Valley as a medicine, chiefly as a remedy in cough complaints. The Assamese class two species under the name *bâhak*, one with white flowers and the other with red. The flowers of both are fried in mustard oil and used as a vegetable.

ADIANTUM LUNULATUM.—*Burm;* Syn.=*Fil.*, 114; *Hk., Ic. Pl., t.* 191.

MAIDEN-HAIR FERN.

Beng.—Kali-jhaut.

This fern is common in many parts of Assam, but its use as an ingredient in certain dye recipes used in other parts of India is unknown in the province.

ÆGLE MARMELOS.—*Corr.; Fl. Br. Ind., I*, 516; *Wight, Ic., t.*, 16.

THE BAEL OR BEL-FRUIT TREE.

Beng.—Bel.

Ass.—Bel.

Common in the plains districts. A yellow dye can be extracted from the rind of the fruit of this tree; but, though commonly used as a medicine, the use of the fruit as a dye appears to be unknown in the province.

AGRIMONIA EUPATORIUM.—*Linn.; Fl. Br. Ind., II.*, 361.

AGRIMONY.

Vern.—Not known

This herb is common in the Naga, Khasi, and Mishmi Hills, but its use as a dye seems unknown to the hill tribes.

ALBIZZIA ODORATISSIMA.—*Benth.; Fl. Br. Ind., II*, 299. Syn.—*Mimosa odoratissima*; *Roxb.; Fl. Ind.; Ed., C. B. C.*, 418.

Ass.—Siris, Jati-koroi.
Garo—Sissoo.
Cachar.—Koroi.

A large deciduous tree, indigenous to Lower Assam. The bark is cut into small pieces and boiled. Pounded leaves and twigs of the *dágál* (*Sarcochlomys pulcherrima*) are then mixed with it, and the yarn is boiled in the mixture. The result is a madder brown.

ALNUS NEPALENSIS.—*D. Don; Brandis; For. Fl.*, 460; *Wall., Pl, As. Rar., t.* 131.

The Nepal Alder.
Vern.—Udis, Udish, N. W. P.

Found in the Naga and Khasi Hills. "It is a tall, sparsely branched, deciduous tree, whose leaves soon become perforated by insects." The bark is useful in tanning and dyeing. "By the Nagas and Manipuris it is used in combination with *Rubia sikkimensis* and *R. cordifolia* to deepen the colour" (*Watt*).

ALOE VERA.—*Linn.*

Barbados Aloes, Indian Aloes.
Beng.—Ghritakumari.
Ass.—Salkuari.

This drug is reported to be common all over the Assam Valley, but it is nowhere used as a dye. In *Spon's Encyclopædia* there occurs an account of the preparation of the dye "Chrysammic acid," of which aloes form an ingredient, and which is used in the production of a vegetable brown (*Watt*).

ALSODEIA BENGALENSIS.—
(*Vide* under "*Kalapát.*")

AMCHANGALA—*Scientific name unknown.*

This is a name given by the people of Darrang to a tree used as a mordant in dyeing. No specimens or description of the tree have been sent.

ARECA CATECHU.—*Linn.; Palmæ.*

The Areca or Betel-nut Palm.

Beng.—Supari.
Ass.—Tamal.

Common to all plains districts; but will not grow in Manipur and only indifferently in Cachar. A red dye is obtainable from this palm, but its use as a dye is unknown in the province.

ARTOCARPUS INTEGRIFOLIA.—*Linn.*

THE JACK-FRUIT TREE.

Beng.—Kánthál, or Káthál.

Ass.—Káthál.
Garo—Thibrong, Teprong.

Though this tree is very common in the province, its use for dyeing purposes seems not to have been recognised. It is known, however, that the wood or sawdust, on being boiled, produces a yellow dye, and, in combination with other ingredients, green and red.

ARTOCARPUS LAKOOCHA.—*Roxb.*

Beng.—Dephal.

Ass.—Dewa.

Common in the plains districts, but not used for dyeing. Yields a yellow dye.

AVERRHOA CARAMBOLA.—*Linn.; Fl. Br. Ind., I,* 439; *Roxb, Fl. Ind. Ed., C. B. C.,* 387.

THE AVERRHOA.

Beng.—Kámránga

Ass.—Kardai.

A common tree in the Assam Valley, cultivated for its fruit, but not known to be used for dyeing purposes.

BACCAUREA SAPIDA.—*Mull. Arg.; Gamble, Man, Sim.,* 354. Syn. = *Pierardia sapida; Roxb., Fl. Ind.; C. B. C.,* 323.

Beng.—Latka.

Ass.—Leteku.

Mikir—Leteka.

A small evergreen tree, common in most of the plains districts in the province. The bark is used as a mordant in dyeing, chiefly with lac and asugach (*Morinda angustifolia*). In Kamrup the juice of the *leaves* of the tree is said to be used with *manjit* (*Rubia cordifolia* or *khasiana* ?) to produce a red dye. In Goalpara, the *leaves* are used as a mordant with *Morinda angustifolia* to produce a red, and in Golaghat it is said that the *leaves* are used with lac to clear the red dye produced by the latter. This use of the *leaves* as a mordant is new to science, and steps are being taken to have them chemically examined, to ascertain their value as a mordant.

BASELLA RUBRA.—*Linn.*

INDIAN SPINACH.

Beng.—Puisák.

Ass.—Purai.

Darrah says ("Note on Cotton in Assam")—"The seed of the *puisák*, which is sometimes used as a vegetable, gives a red colour. Red ink is sometimes prepared from it. Owing, however, to the colour not being permanent, this dye stuff is not much used." The only districts from which its existence is reported are Nowgong and

Jorhat, but it is said not to be used as a dye in either place. The seeds are often pounded in water, and the reddish fluid resulting is used to be thrown about during the *Holi* festival.

BAUHINIA VARIEGATA.—*Linn.; Fl. Br. Ind., II*, 284.

BAUHINIA.

Beng.—Rakta kánchan.

Ass.—Ranga kánchan.

A moderate-sized deciduous tree found in Golaghat, Jorhat, Nowgong, Kamrup, and Darrang, and probably also in Lakhimpur and Sibsagar. The bark can be used in dyeing and tanning, but its use for these purposes is reported to be unknown in Assam.

BERBERIS NEPALENSIS.—*Spreng.; Fl. Ind., I*, 109.

THE BARBERRY.

Khasi.—Dingh-jang-mat.
Synténg.—Lorrong.
Naga.—Inthō, or Unthō.

"A shrub found in the Khasi and Naga Hills, generally at altitudes above 5,000 feet, used to a small extent as a yellow dye chiefly by the Bhutias and Nagas" *(Darrah)*. "The leaves or bark are pounded, tied in a bag or cloth, and placed in cold water, and a dye extracted, which is used as a lotion for inflammation of the eyes" (Jowai). The bark is also said to be manipulated by the Khasis to produce a bright yellow dye.

In the Naga Hills, the Angami Nagas are said to produce a yellow, which they call *lomu*, by simply boiling the cloth with the bark or the roots, or both, of the *unthō* (*Curcúma longa*), until a bright yellow is obtained. No mention is made of any mordant in the account I have received, but I suspect that some mordant is used, for the Angamis are known to dye cloths with a yellow that is very fairly permanent.

BHARALI.—*Scientific name unknown.*

"A middle-sized forest tree. The yarn is first boiled with the leaves of the tree and then dyed with *silika* (*Terminalia citrina* or *T. chebula*), if black is wanted, and with lac if red is wanted. If yellow is required, madder is used. *Tetuli* (*Tamarindus indicus*) is used if no *bharali* be available" (*Darrah*).

BHARTI, OR BHARATHI.—*Scientific name unknown.*

This name is given in the Darrang district to a tree which I have been unable to get identified through want of proper specimens. It is used as a mordant in the Darrang district, chiefly with *Coccus laccæ*. The cloth, before being immersed in the vessel containing the lac dye, is boiled in water with *bharali* leaves till it assumes a yellowish tint.

BHUBI.—*Scientific name uncertain.*

Beng. (*Cachar*).—Bhubi.

The leaves of a fruit tree of this name are used in Cachar, apparently as a mordant, in dyeing *eri* cloth red with lac.

[The tree may possibly be *Garcinia paniculata*, for which Gamble gives *bubi-kowa* as the Sylheti vernacular equivalent. I have not, however, been able to find any record of this variety of *Garcinia* being used in dyeing.]

BICHA (ANGAMI NAGA).—*Scientific name unknown.*

A tree from which the Angami Nagas extract a black dye. No specimens having reached me, I have been unable to quote its scientific name. The Nagas boil down the bark with the cloth or thread to be dyed. When the colour has come out well, the cloth or thread is removed and allowed to dry. "When dry, the cloth or thread is saturated with a mixture of a certain black clay and the bark of a tree called *repo*, and after a couple of hours or so the dyeing is complete." In the above process, it is said that the barks of trees called by the Angami Nagas *theshü, hüta,* and *kwüsi* (*Juglans regia,* or walnut) are interchangeable with that of the *bicha*.

BIXA ORELLANA.—*Linn.; Fl. Br. Ind., I,* 190.

THE ARNATTO OR ARNOTTO DYE.

Ass.—Jarath, or Jarat.
Phakial.—Phang.
Manipuri.—*U rei-rúm,* Reipom.

This is a handsome shrub, which has been introduced into the province, and is now extensively cultivated in the gardens of most villages for the sake of the red or orange dye obtained from the seed-pods and seed. This is one of the most commonly used dyes in the Assam Valley and in Manipur. The seeds are allowed to get quite ripe before being gathered. They can then be kept for a year or two, and used as required, provided they are kept absolutely dry. The pulp which surrounds the seed gives a beautiful flesh colour. The process in common use in Jorhat is as follows: The seeds are first boiled in a vessel in which plantain ashes have been mixed with water. As soon as the mixture reaches the first boil, the cloth to be dyed is immersed in it and allowed to boil for about a minute. The vessel, with the cloth still in it, is then taken off the fire and the contents allowed to cool. The cloth is then taken out and dried, and a yellow dye results. The colour, however, is fleeting, and its tint varies according to the mordant used. The leaves of the *bhowrati* (*Symplocos grandiflora* or *S. spicata*) are also used as a mordant to produce a yellow dye, either with or without another mordant. In Darrang, the process is said to be as follows:—The cloth or thread to be dyed is first boiled in water in which dried *bhomrati* leaves have been immersed. The cloth or thread is then taken out and dried in the sun: this part of the process is called *kah diyá* (কহ দিয়া). The dried arnotto seeds are then rubbed in a sieve so as to get off the covering of the actual seed in the form of dust. This dust, and the ash resulting from burning plantain stems, are then boiled with the cloth, and a yellow dye is obtained "Sometimes the bark of the *silika* (*Terminalia citrina*) is added, when the yellow dye assumes a reddish tint" (*Darrah*). Dr. Watt writes: "The mordant used with arnotto is most frequently crude pearl ash; the alkali facilitates its solution, but the quantity of alkali used must be regulated according to the depth of colour required. The colour is, however, fleeting: it is chiefly used for silk, and seldom or never for woollen fabrics. After dyeing the silk with arnotto, the colour may be deepened or reddened by means of vinegar, alum, or lemon-juice." This holds good for Assam, except that plantain ash is the commonest mordant used, and that lemon-juice is the most commonly used to deepen the colour. The people in Sibsagar consider lemon-juice a mordant (*vide "Citrus medica"*). Major Trotter, writing some years ago, describes the process followed in Manipur, thus: "Eight tolas of seed of the *u rei rom pambi* (*pambi*=plant) tree to be tied in a *jhâran* or other coarse cloth, and steeped in boiling water. When the water has cooled down sufficiently to admit of one's hands being dipped into it, squeeze and press the *u rei rom* seed about in the cloth until the water has become thoroughly coloured, *i.e.*, has extracted all the colouring matter out of the seed. Wash the cloth to be dyed perfectly clean, steep it in this water, pressing and moving it about, until it has well taken the colour of the water; then take out and wash four or five times in clean water. Wring out and dry; thereafter pour a pint of *heibung* (*Garcinia pedunculata*) water over the cloth, and press it about, so that every

part of it may become thoroughly saturated. Then wring out and hang up in the shade to dry." It is said that the use of *heibung* fixes the colour, but this requires confirmation. From the following accounts, which were written by Babu Rasiklal Kundu, Superintendent of the Political Agent's office, Manipur, it appears that arnotto enters into the composition of three different colours of dyes used by the Manipuris, called by them *jugi mairi* (a brilliant but somewhat coppery orange), *angangba* (a dull crimson), and *napu* (a brilliant orange). The accounts, it should be stated, refer to the dyeing of silk :

"*Jugi mairi.*—Pound 1 chittak of lac in a pestle and mortar and mix with it a quantity of *heibung* water so as to soak the quantity of silk to be dyed. Take cleaned silk (for *process of cleaning, vide infra*) and mix it in the mixture thoroughly, by pressing and squeezing it until the silk has taken the colour. Now let it stand for two or three hours. Squeeze and wring it out and put in the sun. When dry, wash it clean. Burn a quantity of *kairang* (*Symplocos racemosa*) leaves and twigs. Take 4 tolas of *u rei rom* and a quantity of *kairang* ash water, or *uti*.* Then rub and squeeze out the dye of *u rei rom* and strain it in a coarse cloth. Now take the dried silk so dyed and rub and squeeze it thoroughly till the dye has well taken. Now boil the silk with the mixture for about 20 minutes until the mixture is almost dry. Take out the silk so dyed and let it remain till it is cool, then wash it clean, wring it out and mix this with *heibung* decoction, press and squeeze it about, then wring it out and put it in the sun by means of parallel bars: in order to stretch out the silk, the lower rod should be heavier. This colour is called *jugi mairi.*

* Process described under heading of cleaning raw silk, *vide infra.*

"*Angangba.*—Take 4 or 5 tolas of *u rei rom* seed and put it in *uti* water and rub it thoroughly until the colour is extracted ; strain out the seeds, put the silk in it and flap it about and press it to take the dye, then put it in a pot and boil for 20 or 30 minutes, wash it clean, wring it out and put in the sun. *Heibung* is soaked in water for 24 hours. Put the cleaned silk in this solution only enough to soak it, squeeze and press it about, and leave it for a while. Pound 4 or 5 tolas of lac (Manipuris call it *cha*) thoroughly. Now take the silk and put it in the *heibung* solution and mix the powder thoroughly, squeeze and press the silk, and let it stand for 24 hours. Now boil in 2 quarts of water the leaves of *kairang* and *moyum*, or madder, cut into pieces, for half an hour. Bark of *moyum* is to be carefully scraped off and cleaned in water before boiling. Then put in the silk and boil it for 15 minutes. Take it out, and wash in clean water. Wring it out and dry in the sun by means of parallel bars as described above. Now the silk is dyed *angangba.*

"*Napu*—Pound a quantity of Manipur raw *haldi* and mix in a little water and then strain the liquid out in a coarse cloth. Take 4 or 5 tolas of *u rei rom* seed and mix it with *uti* water and rub and squeeze out thoroughly until the colour of *u rei rom* is taken ; strain out the seeds ; now put the cleaned silk (*vide* its process) in this dye solution, flap it about and press it till it takes the dye, then put it in a pot and boil it for 20 or 25 minutes, then wash it clean, wring it out and put in the sun to dry. Now put this silk into the *haldi* decoction as described above in a pot and boil it for 15 minutes. Take the silk out and wash clean and wring it out, keep the silk well mixed in *haldi* powder with little water for 24 hours in order to make the dye firm, wash the silk clean with water and wring it out. *U napu* (*Fibraurea trotterii*) is pounded and wetted for 24 hours. In this decoction put the silk dyed previously and press and squeeze carefully, wring it out and put in the sun to dry by means of parallel bars hung up. This closes the operation. This dye is termed *napu.*

"*Process of cleaning raw silk.*—Take a sufficient quantity of straw ash, put it in a thick small basket, press the ashes down, put some straw over the ash so pressed, pour water gently, which will drip through gradually. This water is called *uti* water. Take as much *uti* water as will be required to boil a quantity of silk in a pot; put silk in when the *uti* water is boiling hot; the skein of silk is to go through a piece of polished cane or plantain stem, to enable one to hold the silk with the left hand and a polished stick in the right hand, which will turn round and round until the whole skein

is thoroughly boiled The silk gets pulpy when it is ready to be taken out of the pot. This process takes about 25 minutes. When the silk is cooled down, wring it out and wash clean with cold water by flopping it about, then let it dry in the sun. The silk is now ready for dyeing."

It is stated that the Manipuris domiciled in Sylhet call *Coscinium fenestratum*, which the Sylhetis call *gachh haldi*, by the name of *u ri rûm*, and say that it yields a permanent red dye, but this is probably a mistake (*vide* under "*Coscinium*").

BUTEA FRONDOSA.—*Roxb.; Fl. Br. Ind., II*, 194.

Butea gum, Bengal kino; sometimes called the "Bastard teak."

Beng.—
Ass.— } Palas, or Palash

A moderate-sized, deciduous tree,—one of the most beautiful trees of the plains and lower hills of India. "A small distorted tree with bright orange flowers. These, when dry, are used as a yellow dye, which is obtained by steeping or boiling in water" (*Darrah*). A brilliant but fleeting yellow dye can also be extracted by expressing the coloured sap of the fresh flowers. In Nowgong the process of dyeing with *B. frondosa* is said to be as follows. The roots of the *âchhu* (*Morinda angustifolia*) are boiled, and the cloth or other article to be dyed is soaked in the coloured liquid and then dried in the sun. When dry, the cloth is boiled for about an hour in water in which the flowers of *B. frondosa* have previously been boiled for about a couple of hours. A yellow dye is the result. The gum does not appear to be used in Assam, either as a dye or tan, as it is in other parts of India.

CÆSALPINIA DIGYNA AND C. SAPPAN.—

(*Vide infra*, under "*Teri.*")

CALOTROPIS GIGANTEA.—*R. Br.; Fl. Br. Ind., IV*, 17; *Wight, Ill., t.* 155, 156*A*.

The Swallow-wort.

Beng.—Akanda.
Ass.—Akan.

This shrub is found all over the Assam Valley, but its use as a dye appears to be unknown in the province.

CANNA INDICA.—*Linn.; Roxb., Fl. Ind., Ed. C. B. C.*, 1; *Scitamineæ*.

Indian-shot.

Beng.—Sarba-jaya.

This plant is probably common all over the province. Its existence, however, is reported from Kamrup only. "The seed is black, and round like a pea and yields a beautiful but evanescent purple dye" (*Daly* and *Giles, Bomb. Fl.*).

Its use as a dye appears to be unknown in Assam.

CARALLIA INTEGERRIMA.—*D.C.; Fl. Br., Ind., II*, 439; *Wight, Ic., t.* 605; *Beddome, Fl. Sylv., t. CXCIII; Rhizophoreæ*.

Beng.—Kierpa
Ass.—Kunthekra.

An evergreen tree with thin, dark grey bark, the dried leaves of which are sometimes used in the Mangaldai subdivision of the Darrang district in dyeing with *Coccus lacca* to deepen the colour.

CARBONATE OF LIME.

CARBONATE OF LIME, MARBLE, LIMESTONE, CHALK, AND LIME.

Beng—
Ass— } Chún.

None of the district reports mention this as a component factor in dyeing; but Dr. Watt says that "lime is universally used by the Manipuris to assist in the transformation of green into blue indigo and to deepen the blue colour of indigo; and a small piece placed in the mouth of a vessel containing indigo is also supposed to preserve the dye.

CARBONATE OF POTASH.

POTASHES, PEARL-ASH

Beng.—Yavakshára

The form in which carbonate of potash is mostly commonly used in the province is in the form of the ashes obtained by burning the leaves, bark, or fruit-rind, generally the bark, of the plantain (*Musa sapientum*). These ashes are employed as a mordant.

CARISSA CARANDAS.—*Linn., Fl. Br. Ind., III*, 630; *Wight, Ic. t.* 426, *Apocynaceæ.*

THE KARUNDA.

Beng.—Karenja, Kurumja, Karamcha-búnchitair.
Ass.—Karja.

This tree is found all over the Assam Valley, but is not used for dyeing. In Bengal, its fruit is said by McCann to be used for dyeing and tanning.

CARTHAMUS TINCTORIUS.—*Linn.; Fl. Br. Ind., III*, 386.

THE SAFFLOWER.

Beng. and *Ass.*—Kusum.
Manipuri—Kusum

This plant, with its large orange-coloured flower-heads, is largely cultivated in the Surma Valley, in Goalpara, and in Manipur, for its dyeing properties. Curiously enough, I have not been able to ascertain that it is either used in dyeing, or even cultivated at all, in the Assam Valley. It is very largely used by the Manipuris in Manipur, and possibly the presence of a large colony of that people in Sylhet and Cachar may account to some extent for its common use in the Surma Valley, though, for that matter, the dye is extensively used in Bengal, and especially in the districts forming the Dacca division. The plant is employed generally in Assam to obtain a pink or rose colour dye. This colour is known in Manipur as *goláp machu* (*goláp*=rose, *machu*=colour), a name which has sometimes erroneously been given as the name of the plant itself. The Manipur process was described by the late Major Trotter as follows: "Two and a half tolahs of *kusum lei* (কুসুম লৈ) (*kusum*=safflower, *lei*=flower) to be washed clean, then placed in a *jhára*n, or other coarse cloth, and squeezed and pressed about in two quarts of water, until the water becomes discoloured. This water to be thrown away and the process repeated in fresh water.* After the water has become tinted to a required degree, the cloth to be dyed, having been washed perfectly clean, is steeped in the dye solution and squeezed about until it has well taken the colour of the water. Now take the *kusum lei* out of the *jhára*n and dry it thoroughly, then mix ¾ of a tolah of *khujum pereh* (খুজুম পেরেঃ) (a species of *Acanth ceæ*) ashes with it, and mix together intimately by pounding in a pestle and mortar; then take an earthen pot, perforate three or four holes, and close these holes

* This is probably to get rid of the yellow colouring matter which the flowers contain, and which is useless and injures the quality of the pink dye
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with wisps of straw or pieces of rag (in the same way as is done with the ordinary three-*ghurrah* filters), then sprinkle a layer of damp paddy husks in the pot; over this put in the mixture of *kusum lei* and *kujum pereh* ashes, and over this again sprinkle another layer of paddy husks; then gently, and by degrees, sprinkle 2½ pints of clean water into the pot, and let it drip through the holes into a clean vessel below. Take the cloth, and, after wringing it out, steep it thoroughly in the liquid dye solution, pressing and flapping and squeezing it about, so that every part of it may become thoroughly saturated with it: then wring out the cloth and hang it up to dry in the shade. This colour is called *golap machu* in Manipur." The colour obtained is a brilliant saffron or pink. The tint is deepened by the use of *heibung* (*Garcinia pedunculata*), *vide infra*. It is said that the ashes of plantain roots may be substituted in equal proportions for *khujum pereh* ashes in the above process. In Goalpara, the process is as follows: About a chittak of *kusum* flowers is rubbed and squeezed in 3 or 4 seers of water, which, when it takes nearly all the colour of the flowers, is boiled with the yarn or other article to be dyed for about an hour and a half. The article to be dyed is then wrung out and dried in the sun, and is found to have taken a rose-coloured or *golapi* shade. It will be noticed that boiling forms no part of the Manipuri process. The process in Sylhet is:—Safflower flowers are cleaned and dried in the sun. Then *kalar mujra* (stalk of the plantain) is burnt, and its ashes mixed with the safflower in the proportion of 1 to 2, and the mixture reduced to powder. Then straw and dry grass are put into a *dhuchani* (a small basket made of bamboos generally used in cleansing rice in water), and the powder is sprinkled over them. A vessel is then put below the *dhuchani* and water poured slowly upon the powder. After a time, a small quantity of lemon juice (*Citrus medica* ?) is mixed with the liquid in the lower vessel. The article to be dyed is immersed in the lower vessel, as soon as the liquid in it has acquired the desired shade, and a rose-coloured dye is the result. This process differs very little from the Manipuri process, except that the lemon juice takes the place of the *khujum pereh* ashes.

CASSIA FISTULA.—*Linn.; Fl. Br. Ind.*, II., 261; *Wight, Ic., t.* 269.

The Purging Cassia.

Beng.—Sonali, Sundali, Amultas, Bandarlati.

Ass.—Sunaru.

Cachar.—Bandolat.

Found in all the plains districts of the province. It is used in Darrang and Nowgong as a tan. In Darrang, it is used to tan rough skins, and is said to give a brownish red colour to them. In Nowgong, the bark is pounded and soaked in cold water. The hide is placed in it for a night, taken out and thoroughly beaten. This is repeated for eight days, before the hide is ready for use.

CASTANOPSIS TRIBULOIDES.—*Alph. D.C., Prodr., XVI,* 2,109.

Angami Naga.—Tezzū, Thezhū.

(*Vide* under "*Juglans regia.*")

CEDRELA TOONA.—*Roxb.; Fl. Br. Ind., I,* 568; *Wight, Ic., t.* 161.

The Toon, or Indian Mahogany Tree.

Beng.—Tuni, Tun, Lúd, Tunna.

Ass.—Pama, Hendoori pama, Tun, Jia.

A tree common in many parts of the province, but not used for dyeing. It gives a yellow dye.

CHICKRASSIA TABULARIS.—*Adr. Juss.; Fl. Br. Ind., I,* 568; *Beddome, Fl. Sylvat., t.* 9; *Meliaceæ.*

THE CHITTAGONG WOOD.

Beng.—Chikrassi, Pabba, Dalmara.

Ass.—Bagápoma.

A large tree, the flower of which yields a red and a yellow dye. It is common in the Assam Valley, but is apparently not used for dyeing.

CICER ARIENTINUM.—*Linn.; Fl. Br. Ind., II,* 176; *Wight, Ic., t.* 20, *Leguminosæ.*

GRAM.

Beng.— } Bút.
Ass.— }

This is the common gram of the bazars. It is said to give an indigo dye, but is not used for that purpose in Assam. However, an allied variety, *Vigna catiang* (Ass. *urohi mah*) is used in the production of a green *(vide "Vigna catiang").*

CINNAMOMUM TAMALA.—*Fr. Nees., Fl. Br. Ind, V,* 128.

CASSIA CINNAMON, OR CASSIA LIGNEA.

Beng.—Tezpát.

Ass.—Tejpát, or Dopatti.

A moderate-sized evergreen tree, the leaves of which are used in calico printing in combination with myrobalans (*Darrah*, "Note on Cotton in Assam"). I have not, however, been able to discover in what part of the province it is so used. Probably, however, if used at all, it is in Sylhet, as that is the only district in which calico-printing is carried on.

CITRUS MEDICA.—*Linn.; Fl. Br. Ind., I,* 514.

LEMON TREE.

Beng.—Lebu.

Ass.—Nemu tenga.

"In the Sibsagar district the bark of the lemon and pomegranate trees are boiled with iron filings to dye yarn black" (*Darrah*). It is reported also from Sylhet that it forms an ingredient in certain dye recipes in vogue in that district, but the precise effect of its use in the process of dyeing has not been determined. *McCann* says "The leaves of this plant are used in tanning in Manbhum;" but Dr. Watt thinks this doubtful, and says "at most the leaves can be used only as an adjunct to the tans, imparting an odour to the tans." In Assam lemon juice is used both with and without a known mordant.

CLITORIA TERNATEA.—*Linn.; Fl. Br. Ind., II,* 208; *Bot. Mag., t.* 1542; *Leguminosæ.*

CLITORIA.

Beng.— } Aparajita.
Ass.— }

A common garden flower, found all over the Assam Valley, but not used as a dye.

COCCUS LACCA.—*Kerr.*

THE LAC INSECT.

Beng.—Gúla.
Ass.—Lah.
Manipuri.—Cha.

This insect is indigenous to the province and is reared on a number of trees; *e.g.*, the *arhar* (*Cajanus indicus*), *pakari* (*Ficus cordifolia*), *Juri pakári* (*Ficus comosa*), India-rubber tree (*Ficus elastica*), *Ahat* (*Ficus religiosa*), *bogari* (*Zizyphus jujuba*), and *bur* (*Ficus altissima*). It furnishes one of the dyes most commonly used in the province, both alone and with other ingredients. Used alone, the process is as follows: The lac is pounded to a very fine dust. It is then thoroughly washed in warm water, by rubbing the particles in the hands. The water assumes a red tint, and when all the colour has been extracted from the dust the decoction is very carefully strained so as to prevent any of the dust being left in the dyeing fluid. This is to prevent the lac substance, which is sticky, from afterwards adhering to the cloth or other article to be dyed. The fluid so obtained is then boiled, and, when boiling, the cloth (or thread) is put in and allowed to remain until it assumes the required shade. The result is a red. This process, which I watched in Jorhat, is typical of the simplest form of use of the insect without other ingredients for dyeing purposes. In the Golaghat subdivision, the Mikirs on the Nowgong border follow a similar process, with the exception that they mix the leaves of the *leteku* tree (*Baccaurea sapida*) with the lac dust, with the alleged object of clearing the dye. The result, however, of their process in the specimen I saw is a somewhat dirtier red than if the lac had been used alone. I think it more probable that the object in introducing the *leteka* is to obtain a faster colour than would be obtained from lac alone, the *leteku* leaves being a mordant. With *rum* and *bhomrati* leaves, lac gives a handsome purple (*vide* under *Strobilanthes flaccidifolius*). In Kamrup, the article to be dyed is soaked in the juice of the *leteku* (*B. sapida*), *borthekra* (*Garcinia pedunculata*), and *bhoira* (*Term. belerica*) trees, and then boiled with lac and madder in an earthen vessel, to produce a red. In the same district a very brilliant red or vermilion is produced by first dyeing yarn with madder; a slow fire is then kindled, usually made with rice-husks, and a vessel put on it containing water in which lac has been soaked for two days. The yarn is immersed in the vessel and boiled. The process is repeated till the required shade is obtained. Lac is said not to be found in North Lakhimpur, but it is imported from the districts lower down the river. "It is washed carefully and thrown into hot water, and when it melts, either *amlaki* (*Phyllanthus emblica*) or *hilika* (*Terminalia citrina*) bark, with that of the *madhuriam* (*Psidium guajava*) is put into the liquid: it then yields a black; if *majathi* (= madder) is mixed with the liquid, it gives a deep red colour" (*extract from district report*). From Darrang I have received the following description: Fill four or five pots (*kalsis*), each capable of holding about 10 seers of water, with 4 or 5 seers of lac in each, and then pour in tepid water till the pot is full. Allow the pots to stand for five or six days until the fluid becomes red. Then transfer the liquid from one pot to an earthen or metal vessel called *jhao*, steep about 3 seers of *eri* thread in it, and boil the whole for three hours with the leaves of the *bharati* or *khang* (scientific names unknown), or *leteku* (*Baccaurea sapida*). The proportion of leaves to the liquid is about 1 to 20. Sometimes dried *kuji thekra* (*Carallia integerrima*) leaves are thrown in to deepen the colour. Then wring out and dry the thread in the sun and then boil it in the liquid of the second pot, and repeat the entire process if the thread has not assumed the desired shade. Then crush 3 *powahs* of *majathi*, or madder, and with it boil the thread in the liquid of the third pot; wring out and expose the thread for two or three days in the sun, till it is thoroughly dry. This description applies only to the dyeing of *eri* silk. Cotton fabrics or cloth are never so dyed. To dye cloth, a process similar to that in use in Jorhat is employed, but the colour is often deepened and rendered more permanent by previously boiling the cloth with the leaves of the *amchangala*, *bharathi* (scientific names unknown) and *teteli* (*Tamarindus indica*) trees twice or thrice, till it assumes a yellowish tint. In Cachar, a red is produced by mixing lac with the leaves of a fruit tree called *bhubi* (*Garcinia paniculata*?). For the use of lac in dyeing in Manipur and in the Khasi Hills, see under "*Bixa orellana* (*Jugi mairi*)" and "*Sakubi*."

COCOS NUCIFERA.—*Linn.; Brandis, For. Fl.*, 556; *Palmæ.*

THE COCOA-NUT PALM.

Beng.—Nárikel.

Ass.—Nárikal.

These palms are common all over the plains districts of Assam, but their properties for dyeing appear to be unknown to the people.

COMBRETUM PILOSUM.—*Roxb.*

Beng. (*Sylhet*).—Juni, or Junia.

Manipuri (*Sylhet*).—Tinsipi.

A small shrub, with longish leaves, found in Sylhet, and used to obtain a blue-black or purple colour. The process is as follows: Take half a seer of the half-dried leaves and boil them in 6 seers of water for an hour and a half. Then take off the fire and let stand for twenty-four hours. Wash the cloth to be dyed perfectly clean and dry in the sun. Then steep the cloth thoroughly in the dye mixture, wring out and dry in the sun. Repeat this three times. Then steep the cloth for twelve hours in a vessel containing thin black clay, such as is found in marshy places. This will give a shining blue-black colour; but, to render it more permanent, the whole process should be gone through a second time *ab initio*. The dye is used chiefly by the Manipuris living in Sylhet, and is in very common use among them, owing to its inexpensiveness and the brilliancy of the colour obtained.

CORDIA MYXA.—*Linn.; Fl. Br. Ind., IV*, 136; *Wight, Ic., t.* 169.

THE SEBESTEN.

Beng.—Bohari, Buhal, Bahubara, Bohodari.

Ass.—Bhomoraguti

Common all over Assam, but its mordant qualities are not utilised, if known to the people.

COSCINIUM FENESTRATUM.—*Colebrooke; Fl. Br. Ind., Vol. I*, 99; *Menispermaceæ.*

THE COSCINIUM.

Beng.—Gachh haldi.
Goalpara.—Daruahaldi.
Manipuri.—} Uriram.
Sylheti.—}

It is reported from Sylhet that this tree is called *uriram* by the Manipuris and *gachh haldi* by the Sylhetis. The dyeing process is said to be as follows. The seeds are rubbed in water, and a seer of the solution is added to a quarter of a seer of water in which a quarter of a seer of *kalarmujra* (ashes obtained by burning plantain stalks) and some lemon juice have been mixed. This produces a fast red dye. It is a pity no specimens have been sent to enable the tree to be properly identified, for there is reason to believe that the tree to which the name *uriram* and *gachh haldi* have been applied is not *C. fenestratum*, but the arnotto (*Bixa orellana*). In the first place, *C. fenestratum* has hitherto been known to produce only a yellow dye, while the arnotto is known to give a red as well as a yellow dye. Again, *uriram* is probably the same word as *u rei rûm*, which is known to be the equivalent used in Manipur itself for arnotto. It will be noticed also that the essential features of the process described above and those of the accounts given of the use of the arnotto (*q v.*) are much the same. In each case, the seeds are employed, and they have to be well rubbed, thereby suggesting that it is the dried pulp round the seed that furnishes in both cases the dyeing properties. On the other hand, all the authorities I have consulted state that it is the bark and wood, and not the seeds, of *C. fenestratum* which contain colouring matter.

CRATÆVA RELIGIOSA.—*Forst.: Fl. Br. Ird., Vol. I,* 172; *Capparideæ.*

Hawthorn.

Beng.—Barun.

Darrah says the rind of the fruit is used as a mordant, but none of the district reports mention it as being in use at present.

CUDRANIA JAVANICA.—*Trecul.*

Kachari.—Kulikatagachh.

A tree used in dyeing by the Kacharis of the Tambalpur tahsil in Kamrup. The heart wood is cut into small chips and then pounded to shreds. Yarn or cloth already dyed with *phutlâng* (*q. v. infra*) is then boiled with the shreds in the same way as in the case of *phutlâng*, and the result of the two processes is to impart a brilliant yellow. Yarn dyed by the *kulikâta* and *kuchia tengá* (*vide infra*) trees is sometimes again dyed with lac, and a light red is imparted.

CURCUMA AROMATICA.—*Salisb.; Roxb.; Fl., Ind., Ed. C. B. C.*, 8.

Wild Turmeric.

Beng.—Banhalud.

Ass.—Keloodi.

(See under "*Curcuma longa.*")

CURCUMA LONGA.—*Roxb.; Fl. Ind., Ed. C. B. C.*, 11.

Turmeric.

Beng.—Halud.

Ass.—Haladhi, or haldi

[*Note.*—The remarks under this dye are subject to the reservation that some of them should probably come under "*Curcuma aromatica.*" The reports I have received speak as a rule simply of "turmeric" or "*haldi*," and do not even state whether a wild or cultivated variety is meant. This is unfortunate, in view of the great confusion that exists regarding these two products. Under the circumstances, I have thought it safer to collect all the information I have received under one head with the above reservation than to accept the distinction made in some cases between the two varieties, or to attempt to classify them, where no such distinction has been drawn.]

This common product is recognised as a dyeing agent all over the province. The rhizomes yield a yellow dye, which is, however, somewhat fleeting. Turmeric is rarely used alone as a dye, and the ingredients with which it is associated are somewhat numerous. In Cachar, a light yellow, known as *basanti*, is produced by boiling turmeric "with a lemon-like, slightly sour fruit, which in Bengali is called *thaikar*." In Hailakandi, in the same district, the turmeric powder is mixed with the ashes obtained by burning plantain bark, and dissolved in water. The cloth is then soaked in the water, and afterwards washed in *thaikal* juice. In Sylhet "the juice of turmeric and yellow-coloured earth are mixed together," put in water, and the cloth steeped in it for a night. Next day it is dried in the sun, and then moistened with lemon juice. The result is a yellow dye. A darker yellow, called *dhâni*, is produced by substituting indigo for the yellow earth in the above process. In Manipur, a yellow shade, known as *leingang*, is obtained by the use of turmeric with a species of earth known as *leingang* and *heibung* water. (For the process see below, under "*Leingang.*") A green (Manipuri = *ashangba*) is obtained by the following process: "Soak a seer of wild turmeric root (it must be fresh) then pound it into shreds and sprinkle as much water over it as it will absorb; then squeeze out the juice into a shallow vessel; and into this dip a cloth that has recently been dyed *hikok* (= blue, see under "*Strobilanthes flaccidifolius*"); press and squeeze it about for eight or ten minutes; then let it steep in the juice, having covered it over with

the pounded *haldi* for six or eight hours; then wash clean in fresh water, wring out and steep thoroughly in a pint of *heibung* water (*Garcinia pedunculata*); then wring out and dry in the shade. If the cloth has not assumed the proper shade, repeat the process" (*Trotter*). Turmeric is also used by the Manipuris to produce a brilliant orange called *natu*. (See under "*Bixa orellana—napu.*")

Curiously enough, turmeric is very little used in the Assam Valley for dyeing purposes, though plentiful everywhere. I have ascertained that the Mikirs on the borders of Nowgong and Golaghat extract a dirty yellow from the roots by soaking them in cold water; and in Nowgong the green (not dried) roots are pounded, and in the juice extracted the cloth is simply allowed to soak till it becomes yellow. The people of Nowgong also extract *abir* powder by the following process: Slices of *haldi* roots are dried in the sun, and when dry are put in an earthen vessel with water; lemon juice is added, and the mixture is allowed to stand for a night; next day the vessel is allowed to stand in the sun. This is repeated for three consecutive days. The slices are then pounded up, and the water strained off through a cloth. The deposit is said to be an excellent *abir* powder. From the other districts in the valley it is reported that turmeric is not used at all for dyeing.

CUSCUTA REFLEXA.—*Roxb.; Fl. Br. Ind., IV*, 225; *Convolvulaceæ*

The Dodder.

Beng.—Haldi—algusi—lutta, Algusi.
Ass.—Ákási lata, or Rábanar nári.

This is a very common creeper in the province, but it is nowhere used in dyeing.

DHOP, or DHOPABAR.—*Scientific name uncertain.*

An account has been furnished me from Mangaldai of a dye procured from a tree of this name, but no specimens have been sent, and I have therefore been unable to identify it. The process employed in Mangaldai is as follows: take about a seer of the bark, and then mash it up and steep in about 5 seers of water in a vessel; let it stand for two days, and then immerse the cloth in the mixture, and boil it thoroughly for about an hour; then throw in a small quantity of lime dust, and take out the cloth and dry it in the sun. The dye appears to be a pale red, and to be used only by the Hindus, and not by the Cacharis, in the district.

DIOSPYROS EMBRYOPTERIS.—*Pers.; Fl. Br. Ind., III*, 556; *Wight, Ic., tt.* 843, 844.

The Ebony Wood.

Beng.—Gáb.
Ass.—Kendu.

A dense, evergreen, small tree, with dark green foliage and long shining leaves, common in most parts of the province. The fruit is a powerful astringent, and furnishes a useful tan, and is commonly used by fishermen to make their nets durable. The half-ripe fruits, when steeped in water, yield a brownish dye, and, when combined with myrobalans (*Terminalia chebula*) and proto-sulphate of iron, *hirákas*, are known to yield a black dye. But the use of the tree as a dye seems to be unknown in the province: it is most commonly used for the purpose of *gáb*-ing boats. To do this, the half-ripe fruits are pounded in a mortar or husking trough (*dheki*), and then kept six or seven days in water till they have decomposed. A gummy solution results, which is poured off, the sediment being thrown away. The gummy solution is applied like varnish to boats, to enable them to resist the action of the water.

DIOSPYROS KAKI.—*Linn.; Fl. Br. Ind., III.*, 555; *Wight, Ic. t.* 415.

THE CHINESE FIG.

"A small tree, native of the Khasi Hills, Upper Assam and Burma" (*Watt*). Combined with sulphate of iron, this tree gives a black dye, but it is not used for dyeing purposes in Assam.

DIOSPYROS LANCEÆFOLIA.—*Roxb.*

Meeh—Tepál tenga.
Sylhet.—Gúlal.

The bark of this tree is used by the Meches in the Goalpara district as a mordant, with indigo, madder, and turmeric.

ERYTHRINA INDICA.—*Lam; Fl. Br. Ind, II*, 188; *Wight, Ic., t.* 58.

THE INDIAN CORAL TREE.

Beng.—Palita mandar.
Kachari—Madar.

"A moderate-sized quick-growing tree with straight trunk, which is usually armed with prickles when young." *Darrah* describes it as "a small tree wild in the Assam Hills. The dried red flowers, on being boiled, yield a red dye."

EUGENIA JAMBOLANA.—*Lam; Fl. Br. Ind., II.*, 499; *Wight, Ic., t.* 535.

BLACK PLUM.

Beng.—Kála jám, Jám.
Ass.—Jamu.
Garo—Chambu.

An indigenous forest tree, common in all the plains districts of the province. In the Jorhat subdivision, the barks of the *jamu*, *madhuriam* (*Psidium guaiava*), *hilika* or *silika* (*Terminalia chebula* or *citrina*), and *amlaki* (*Phyllanthus emblica*) are combined to obtain a black dye. The barks are pounded together and boiled in water. The cloth is then put in and boiled for about an hour, taken out, and dried in the sun. When dry, it is put in cold water and again dried. If not sufficiently black, it is again immersed in the same vessel as before, and dried again, and so on till the required colour is obtained. In Nowgong and Lakhimpur, the bark of the *jamu* is used by itself, and a process similar to the above is gone through to produce a bluish black. It is also reported from Lakhimpur that the barks of the *hilika*, *amlaki*, and *jamu* are mixed with sulphate of iron to produce a black. In Darrang, a black dye is obtained by mixing the barks of *jamu* and *mádhuriám* only; or *hilika* can be substituted for *jamu*. The process is the same as that in Jorhat, except that after being boiled, and before being put into cold water, the cloth is caked with liquid mud for about 15 minutes; it is not stated what kind of mud is used, nor is the reason given for its use. In Cachar, the Manipuris colour European-made cloth by boiling it in water along with the following: *haritaki* (*Terminalia chebula*), *junialat* (?), the bark of the mango tree (*Mangifera indica*), and the bark of the black *jam* tree (*Eugenia jambolana*). In Sylhet, the Tipperahs mix the bark of the *amlaki* (*Phyllanthus emblica*) with those of the *haritaki* and *kila jám*. The bark is largely used by fishermen to dye their nets, and is also combined with the red *manjit* dye to add brilliancy to the colour.

FAGOPYRUM ESCULENTUM.—*Moench.; Fl. Br. Ind., V.*, 55.

THE BUCKWHEAT, OR BRANK.

Ass—Doron.

There appear to be many varieties of this plant, some with pink, others with white, flowers. It is found in the Khasi Hills, Manipur, and all over the Upper Assam Valley.

It affords a yellow dye ; but as far as can be ascertained no experiments have been made with it for dyeing in the province.

FIBRAUREA TROTTERII.—*Watt, Ms.*

Manipuri.—Napu.

An extensive climber, common in the forests of Manipur, which is used by the Manipuris to produce a yellow dye. The late Major Trotter, the discoverer of the plant, described the process of dyeing with the plant thus : "Five chittaks of dry root of the *napu* tree to be washed clean and beaten into long shreds ; then soak it in 2½ quarts of water for fifteen or twenty minutes, when it will be found that the water has become of a yellow colour; this water to be put aside, as it will be required later on. Take out the pounded roots and re-steep in the same quantity of fresh water and let stand for twenty-four hours ; then wash the cloth to be dyed clean, and thoroughly soak it in the first solution, and take out and repeat the process in the second water, leaving the cloth to soak in it for about half an hour; then wring out and steep in half a pint of *heibung* water [prepared very simply, *viz.*, by soaking ½ a seer of the *heibung* (*Garcinia pedunculata*) fruit, cut in slices, in a pint of water for twenty or twenty-four hours], pressing and flapping it about in the vessel, so that every part of it may become thoroughly saturated with this water, then wring out and dry in the shade." For a further account of the use of the plant in dyeing silk, see under "*Bixa orellana—napu.*"

FICUS GLOMERATA.—*Roxb.; Fl. Br. Ind., V*, 535 ; *Roxb., Corom., Pl. II, No.* 123 ; *Wight, Ic.*, 667 ; *King, Ficus, pp.* 173,174, *Pll.* 218, 219 ; *Brandis, For. Fl., Pl.* 49.

The Gular Fig.

Beng.—Yajnadumbar.
Ass.—Khahaka dimaros.

Found all over the Assam Valley. Known to yield a black dye, but not used for dyeing in Assam.

FICUS. RELIGIOSA.—*Linn.; Fl. Br. Ind., V*, 513 ; *Wight, Ic., t.* 1967 ; *King, Fic.* 55, *t.* 67A, 84 ; *Bedd., Fl. Sylv, t.* 314.

The Peepul Tree.

Beng.— Asvattha.
Ass.—Ahat.
Cachâr.—Borbur.

This tree is found wild all over the plains-districts of the province, and is known to yield (1) a faint reddish fawn colour, (2) with other barks, a black, and (3) (the roots), boiled in water with alum, a pale pink on cotton cloth. It is not, however, used in dyeing in Assam, though it is one of the trees on which the lac insect is reared.

FLEMINGIA CONGESTA.—*Roxb.; Fl. Br. Ind., II*, 228 ; *Wight, Sc., t.* 390; *Leguminosæ.*

Beng.—Bara-salpan, Bhalia.

An erect, woody, shrub, from which the Waras dye is extracted. The shrub is found in Sylhet, but its use in dyeing appears to be unknown.

GARCINIA COWA.—*Roxb.; Fl. Br. Ind., I*, 262 ; *Wight, Ic., tt.* 104, *Ecc.*, 113.

Gamboge Tree.

Hind.—Cowa.

This is a tall evergreen tree, said to grow in Assam (*Gamble*), but its existence is not reported from any of the districts. At any rate, its use in dyeing seems to be unknown in the province, though elsewhere it is known to produce a light yellow.

GARCINIA PANICULATA.

(See under "*Bhubi*," *supra*.)

GARCINIA PEDUNCULATA.—*Roxb.; Fl. Br. Ind., I*, 264; *Wight, Ic., tt.* 114, 115.

THE GAMBOGE TREE.

Beng.—Tikur.
Ass.—Barthekra, Kiyi thekra tenga.
Manipuri.—Heibung.

A tall tree, found in most districts of the province, flowering from January to March, and the fruit ripening till June. The fruit is used very extensively in dyeing in Manipur, as an ingredient with other substances in dye recipes. For its use by the Manipuris, *see* under "*Bixa orellana*," "*Carthamus tinctorius*," "*Fibraurea Trotterii*," "*Curcuma longa*," and "*Leingang*." The quality for which it is most valued by the Manipuris is its alleged power of rendering fast the saffron dye obtained from *Carthamus tinctorius*. Dr. Watt, in the absence of better evidence than has yet been obtained, is inclined to doubt its possessing this quality. But in reply to my enquiries on the subject, I am informed that the Manipuris believe very strongly in its existence. In Kamrup the juice extracted from the *leaves* is said to be used with madder, and the leaves of the *bhoira* (*Terminalia belerica*) and *leteku* (*Baccaurea sapida*) trees to produce a red. The leaves of these three trees are pounded together, and the cloth, etc., steeped for three days in the juice extracted before being boiled with the madder. The *bhoira* and *leteku* are known mordants, and this use of the *barthekra* seems to point to the existence of a belief, in Kamrup also, of mordant properties in the *leaves* of the tree. The tree is little, if at all, used in dyeing in other parts of the province.

GARCINIA XANTHOCHYMUS.—*Hook. f.; Fl. Br. Ind., I*, 269.

Ass.—Tepur, Tezpur, Tihur.
Phakial—Mahola.
Garo.—Mauhola.

Found in the Khasi Hills and the Assam Valley, and yields a large quantity of indifferent gamboge. The Phakials, a tribe of Shan origin, in the sadr subdivision of the Lakhimpur district, employ the bark to produce a bright yellow. The mordant used is the green leaves of the *bhomrati* (*Symplocos grandiflora*). Mustard oil and cow's urine is also said to be used. The proportions are given as follows: Pounded *tepur* bark or chips of the bark, 4 parts; *bhomrati* leaves 2 parts; mustard oil 4 parts; cow urine 1 part; and water 16 parts. The cloth or thread is boiled for two or three hours in the mixture over a slow fire, and then taken out and dried in the sun. This process is repeated for three consecutive days. It is reported from Nowgong that the tree, though known there, is not used for dyeing.

GARUGA PINNATA.—*Roxb.; Fl. Br. Ind., I*, 528; *Burseraceæ*.

Beng.—Jum-khaspat, Nilbadi.
Ass.—Gendheli poma.
Garo.—Chitompa.
Mech.—Gia.

The bark is a useful tan, but its use is unknown in Assam.

GERANIUM NEPALENSE.—*Sweet; Fl. Br. Ind., I*, 430; *Wight, Ill., I*, 153, *t.* 59; *Geraniaceæ*

Hind.—Bhanda.

A herbaceous prostrate plant found in the Khasi Hills. It affords a red dye, but the dye is not extracted by the Khasis.

GMELINA ARBOREA.—*Linn ; Fl. Br. Ind., IV*, 581 ; *Wight, Ic , t.* 1470 ; *Verbenaceæ*

Beng.—Gámári; Gumar, Gumbar.

Ass.—Gomari.

Garo.—Bolkabak.

The wood-ashes and fruit are said to be used as dyes by the Santals in their own country, but the Santal coolies do not appear to use them for this purpose in Assam, though the tree is common all over the Assam Valley.

GYMNEMA TINGENS.—*W. & A.; Fl. Br. Ind., IV*, 31.

GYMNEMA INDIGO.

A climbing shrub found in the Assam Valley and Sylhet, from the leaves of which the Burmese have been said to extract a green dye, but it is further said that the cloth has to be dyed yellow either before or after the application of the colour extracted from the leaves of this plant. The properties of the tree as a dye seem to be unknown in Assam.

HEDYOTIS CAPITELLATA.—*Wall.; Fl. Br. Ind., III*, 56.

Common on the Burma-Manipur frontier, but not used as a dye, though it is said to be used by the Lepchas as a green dye and by the Paharias in their own country, mixed with the leaves of *Luculia*, as a blue dye. "I found no trace of the use of either species (*H. capitellata* and *H. scandens*) as a blue dye among the Nagas. Although both the plants are very plentiful, the Nagas regularly import from Manipur and Assam the *rám* dye (*Strobilanthes flaccidifolius*)" (*Watt*).

HIBISCUS ESCULENTUS.—*Linn ; Fl. Br. Ind , I*, 343.

THE EDIBLE HIBISCUS.

Beng.—Dhenras.

Ass.—Bhendi. or Tarai.

Found all over the province, but not used as a dye. "The stigmas are replete with a very beautiful deep purple juice, which they communicate to paper, and which is tolerably durable."

HIBISCUS ROSA-SINENSIS.—*Linn..; Fl. Br. Ind.*, 344.

THE SHOEFLOWER.

Beng.—Joba.

Ass.—Joba.

An ornamental bush, commonly cultivated in gardens in the plains districts of the province, but not used as a dye. The flowers are said to produce a purple dye.

HUTA (ANGAMI NAGA).—*Scientific name unknown.*

A tree of which I have not received either a description or a specimen, but the bark of which appears to be interchangeable with those of *bicha* (Angami) *theshu* (Angami) and *kwusi* (Angami) (*Juglans regia*, see under "*Juglans regia*") in the process employed by the Nagas to dye cloths black.

ILEX AQUIFOLIUM.—*Linn.; Ilicineæ.*

THE EUROPEAN HOLLY.

"A small tree, native of Europe; introduced into India and commonly found in gardens within the temperate tracts. According to Mr. C. B. Clarke, it may also be a native

of the Naga Hills on the frontier of Assam, for he collected a holly, not in flower or fruit, but which possessed leaves that matched accurately those of the common holly. The writer found, in many parts of Manipur and the Naga Hills, bushy, sterile forms of what he took to be *Ilex dipyrena*, but possessing very thorny, broad ovate leaves, which much resembled in form and texture those of the true holly. Manipur is peculiarly a country of hollies, no less than five species having been collected, all of which in their higher limits were seen to become flowerless, and form stunted bushes with very spinose leaves. Of these five species, three are undescribed. The Manipur hollies are *I. Dipyrena* (*Wall.*); *I. Thomsoni* (*Hook f.*); *I. Sikkimensis* (*King Mss.*); *I. Duniana* (*Watt Mss*).; and *I. Monopyrena* (*Watt Mss.*). The common holly contains the principle *ilixanthine*, a yellow colouring substance soluble in concentrated hydrochloric acid. With alum it dyes yellow, and with ferric chloride green" (*Watt*). The dyeing properties of the holly appear to be unknown to the Manipuris.

IMPATIENS BALSAMINA.—*Linn.; Fl. Br. Ind., I,* 453; *Geraniaceæ.*

THE GARDEN BALSAM.

Beng.—Dupate.
Hind—Ful-mendi.

"The writer received from the Jaintia Hills a few samples of plants used by the inhabitants for dyeing Among these was found a specimen of this balsam, with the remark 'Leaves when bruised together with *Metchta langa*, give a red colour.' The writer cannot discover a detailed account of the chemistry of this plant, and is, therefore, unable to offer any opinion as to the nature of the red dye it contains. That it does possess a colouring principle, and one closely allied to madder in appearance, there seems to be no doubt' (*Watt*). I regret that I have been unable to secure further information on the subject of this plant as used in dyeing in the Jaintia Hills. It is said to be found in the Darrang. district, and is probably found in a cultivated form in gardens all over the province, but it does not appear to be used as a dye anywhere but in the Jaintia Hills.

INDIGOFERA TINCTORIA.—*Linn.; Fl. Br. Ind., II; Wight, Ic., t.* 365.

THE INDIGO PLANT OF COMMERCE.

Beng.—Nil.

No detailed description of this well-known plant is necessary here. It has been believed hitherto that the plant was unknown in Assam; but I am now informed that it used to be grown in Mangaldai, chiefly by the Mussulmans, and was used by them to dye their wearing apparel. The plant is said to be still in existence in some parts of that subdivision. The method of dyeing was as follows: The leaves were pounded in a *dheki* (trough for husking paddy) or pestle. The juice so extracted was mixed with lime and allowed to settle, and the liquid was then poured off. In Cachar, the leaves are reported to be used in combination with bamboo *khárpáni* (ash water) to produce a black dye. The following description has been received from the Kamrup district: The leaves of *nilpát* [wild indigo plant (*nil* = indigo, *pát* = leaf)] are soaked in water in an earthen vessel for three days. When the leaves get rotten, they are pressed with the hands so as to squeeze out the juice. Into the juice thus obtained a small quantity of *kalakhár* [alkali obtained from the ashes of plantain trees (*kal* = plantain, *khár* = ash)] is thrown. The article to be dyed is then soaked in the mixture for 48 hours, after which it is taken out and dried in the sun. This process is repeated three times; and when this has been completed the article to be dyed is boiled in a decoction of water with *nilpát* leaves. The result is a black colour. In Goalpara, the plant is called *nilgáchh* (*lit.* indigo tree), and is commonly cultivated by the Meches around their homesteads. The whole plant, including the twigs and leaves, is cut into pieces and boiled in water with the article to be dyed. A plant of average growth boiled in 5 or 6 seers of water will dye 2 to 3 seers of yarn. After the thread is boiled

for one and a half to two hours it is wrung out and dried in the sun. It yields a blue colour.

I have inserted these descriptions here, on the strength of the district reports that the plant used was *Indigofera tinctoria*. But it is open to doubt whether the plant used was not really the *rûm* plant (*Strobilanthes flaccidifolius*), which is so common in the districts of the Upper Assam Valley, and which forms the usual substitute in those districts for indigo. In Sylhet, indigo is said to be used with turmeric to produce a dark yellow (see under "*Curcuma longa*"). (See also under "*Osak*" *infra*.)

IRON SULPHATE.—*Ball; Geol. of India*, 419.

GREEN VITRIOL, GREEN COPPERAS.

Beng.—Hirâkas.

"Ferrous sulphate occurs in the form of green crystals soluble in water. It is formed abundantly by natural oxidation of iron pyrites, and is apt to undergo a further alteration into the red sulphate of the sesquioxide or ferric sulphate. . . . . Natural green copperas is to be found in many parts of India, and is largely employed by natives for dyeing" (*Watt*). The only district in Assam in which iron sulphate is reported to be used in dyeing is Sylhet, where it is used with myrobalans to produce a grey or ash colour. It is apparently used as a mordant, and the colour is said to be a permanent one (see under "*Terminalia bellerica*").

IXORA ACUMINATA.—*Roxb.; Fl. Br. Ind., III*, 137; *Rubiaceæ*.

Ass.—Thekra.

A robust glabrous shrub, mentioned by *Darrah* as being used as a mordant, chiefly with *arnotto* (*Bixa orellana*).

JASMINUM HUMILE.—*Linn.; Fl. Br. Ind., III*, 602; *Wight, Ic., t.* 1258.

JASMINE.

Beng.—Svarnajui.
Ass.—Málati.

Common all over the Assam Valley; its roots are said to yield a yellow dye, but the fact appears to be unknown in this province.

JUGLANS REGIA.—*Linn.; Fl. Br. Ind., V*, 595; *Juglandeæ*.

THE WALNUT TREE.

Beng—Akhrot
Ass.—Akhrot, or Kabsing.
Naga (*Angami*).—Kwûsi.

This tree is found in many parts of the province; but the only district in which it is reported to be used in dyeing is the Naga Hills, where it is used to produce a black dye [*tepfuni kwüchā* (Angami), *akugubo* (Sema)]. The barks of several trees are used indiscriminately, apparently, any one of them being considered as good as any other. The trees so used are called *bicha* (Angami), *thezhu* (Angami) (*Castanopsis tribuloides*) *hutô* (Angami), and *kwüsi* (Angami). "The bark of the tree is boiled down with the article to be dyed. When the colour has come out well, the article is removed and allowed to dry. When dry, the cloth is saturated with a mixture of a kind of black clay with the bark of the *repo* tree. After a couple of hours, the dyeing is complete." I have been unable to discover the chemical properties of the earth used, or to identify the *repo* tree, but one or other, or both, are apparently used as a mordant. *Watt* mentions that the rind of the

fruit is used as well as the bark in dyeing and tanning. The Revd. E. W. Clarke writes me from the Mokokchang subdivision of the Naga Hills district that "the white walnut or butternut tree, as frequently called in America, is in the forests here, but the bark is probably never used for dyeing, as was sometimes done in early days in America."

KALAPÁT.*—*Scientific name uncertain.*

Kachari.—Kalapát.

Mech.—Chatokala, Barakala.

Kalapát is the name given in the districts of Kamrup and Goalpara to a plant cultivated round the villagers' homesteads solely for its dyeing properties. The Kacharis in particular are much addicted to the use of this dye, and they appear to extract a black and a blue-black from it,—more commonly, a black. There are two varieties known under the common name of *kalapát*: one has thorns on its stems, and the other has not. The Meches call them *chota kala* and *bara kala*. There appears to be little difference in the colours extracted from the two varieties. In Barpeta, the process of dyeing is thus described: The leaves are pounded up and soaked in cold water for two or three days. The mixture is then steamed, and this brings the colour out. It is then stirred for a while, which turns the colour gradually to a black. (Apparently, by varying the length of time during which the steaming and stirring lasts, the colour can be varied from a deep blue to black.) The cloth or yarn to be dyed is then immersed in the mixture, and kept there two or three days. It is then taken out, thoroughly wrung out, and dried in the sun. This process is repeated until the desired shade is obtained. This done, fresh *kalapát* leaves are procured, and the cloth, already coloured, is boiled with them in water over a slow fire. This is said to render the colour fast, although there is no mention of any mordant being used. A similar process is gone through in Goalpara; but there they use the leaves of the *leteku* tree (*Baccaurea sapida*) as a mordant in the proportion of 4 parts *leteku* leaves to 5 of *kalapát* leaves. Probably some such mordant is also used in Barpeta. In the Bijni tahsil, the leaves of the *bhoira* (*Terminalia belerica*) and *panipiali* (*Melastoma malabathricum*) trees and the *bark* of the *letcku* and *tepal tengá* (possibly the same as *Tepur tenga*=*Garcinia xanthochymus*) trees, are used as mordants.

KEREPRÚ.—*Scientific name unknown.*

Angami Naga.—Kereprú.

Sema Naga.—Atsita.

A creeper, the leaves of which are used by the Nagas to prepare a green (*Angami*=*lhoshü*). The leaves are well pounded and left for a day or two till the colour comes out strong; the cloth, thread, or other article to be dyed is then put in with the pounded leaves and allowed to remain for a day or two; the cloth, or thread, etc., is then removed and boiled in an earthen pot with the leaves of a plant called in Angami *tsoprü*, and in Sema Naga *akatsopü* (*Strobilanthes flaccidifolius*). A very dark green is thus obtained. The more boiling given, the better, so it is said, is the colour obtained.

KHANG.—*Scientific name unknown.*

Kachari—Khang.

A tree, so called by the Cacharis in the Mangaldai subdivision, the leaves of which are used as a mordant in dyeing with *Coccus lacca*.

* It has been suggested that *kalapát* is *Alsodeia bengalensis*, which is known to grow in Assam, and for which the Nepali vernacular equivalent is *kalapát*. The suggestion is, however, probably based on the resemblance between the vernacular names, and this is of course a very unsafe basis to go upon. I am inclined to think *kalapát* is simply *Strobilanthes flaccidifolius*.

KHARANI, OR KHÂRPÂNI.—

Ass.—Khârpâni.

This is the name given to water in which ashes have been steeped. In Cachar, the ashes of the bamboo are commonly used, *e.g.*, *vide* under "*Indigofera Tinctoria.*" For the use of plantain ashes, *vide* under "*Musa sapientum.*"

KHOIKHU.—*Scientific name unknown.*

Mishmi.—Khoikhu.

"The twigs of this plant are sometimes used by the Phakials instead of the *asugach* (*Morinda angustifolia*). It produces a dark red" (*Darrah*). The process is the same as that described under *M. angustifolia*.

KUCHIATENGA.—*Scientific name uncertain.*

Kachari.—Kuchia tenga.

Used apparently as a mordant with *Coccus lacca* to produce a light red. The name is one given by the Kacharis in the Kamrup district to one of the numerous trees known as *tengas*. From a specimen, which was, however, a defective one, sent to the Reporter on Economic Products to the Government of India, he conjectures that the tree may be *Tamarindus indica* (*q.v.*)

KWÛTHO.—*Scientific name unknown.*

Naga.—Kwûtho.

A name given to a tree found in the Naga Hills. Its roots are used with the leaves of the *magwii* tree to produce a brick red (see under "*Magwii*").

LAC (*Coccus lacca*)—

Beng.—Gâla.
Ass.—Lâh.

[See under "*Coccus lacca.*"]

LACHAN.—*Scientific name unknown.*

A tree, so called in the Darrang district, the seeds of which are used to dye thread yellow. The method of preparation and use is similar to that employed in the case of *asukâth* (*Morinda angustifolia*). The bark also gives a very dark red, and is used by fishermen to colour their nets. The bark is boiled in water, and the nets are then immersed in it, kept there for half an hour, and then taken out and dried in the sun.

LAGERSTRŒMIA PARVIFLORA.—*Roxb.; Fl. Br. Ind., II*, 575; *Wight, Ic, t. 69.*

Beng.—
Ass.— } Sida.

This tree is found in the Nowgong and Sibsagar districts, but no efforts are made to extract the black dye it is known to yield, nor is any portion of the tree used in tanning.

LAKEDEMA. —*Scientific name unknown.*

"The seeds of this plant are pounded and mixed with powdered rice and mustard oil (the proportion being 1 seer of seed to 1 chittak of rice and ½ chittak of oil). This mixture is then smeared upon and well rubbed into the yarn, upon which boiling water, sufficient to moisten it, is poured The yarn is then dried, and this process is repeated about three times a day for seven days. The colour is fixed to some extent by smearing the yarn with a powder obtained by pounding the root of the *haldi* plant, and again moistening the yarn with boiling water. It is not quite clear whether this *haldi* powder is purely a mordant, or is partly a dye stuff. By this process a red colour is obtained" (*Darrah*). The use of the rice is also peculiar. See also under "*Magwa*," where rice-water is said to be a mordant. Possibly, the rice in the above process is used as a mordant. (*Vide* also remarks under "*Oryza sativa.*")

LAWSONIA ALBA.—*Lam.; Fl Br. Ind., II,* 573; *Wight, Ill. t.* 87; *Lythraceæ.*

THE HENNA PLANT, CAMPHIRE, CYPRESS SHRUB, OR EGYPTIAN PRIVET.

Beng.—Shudi, or Mehedi.

Ass.—Mahundi.

"A small, elegant, and sweetly-scented bush," found in all the plains districts of the province; but the only district in which it is reported to be used in dyeing is Sylhet. In Darrang, its use as a dye is said to have been abandoned. In neither case has any description been given of the method employed, or of the colour extracted.

LEINGANG.—(*Manipuri.*)

YELLOW OCHRE.

A species of earth found nearly everywhere in the Manipur valley. The late Major Trotter described the process of dyeing with it as follows: "Wet a chittak of wild turmeric (*haldi*) and rinse out its colour into 1½ quarts of water; then mix 2 tolahs of *leingang* in the water; add ¼ of a pint of fresh milk, and then strain. Wash the cloth to be dyed thoroughly clean, and then steep it in this mixture, press and squeeze it about, and then let it soak for half an hour. Wring out and dry, and when dry, steep it again in the mixture as above. Wring out and steep in ¾ of a pint of *heibung* (see under "*Garcinia pedunculata*") water, thoroughly, and wring out dry in the shade." The result is a pale yellow dye. *Darrah* states the resultant colour to be khaki, but the specimen of dyed cotton I have received is a distinct yellow.

LINUM USITATISSIMUM.—*Linn.; Fl. Br. Ind., I,* 410.

FLAX AND LINSEED.

Beng.—Tisi

Linseed oil is used as an ingredient in a dye recipe for obtaining a red colour from *Morinda citrifolia* (*q.v.*).

LORANTHUS PENTAPETALUS.—*Roxb.*

Ass.—Rojhumala.

The bark is said, by *Darrah*, to be used with those of the *jamu*, *mádhuriám*, and *hilika* trees to produce a slate brown (see under "*Eugenia jambolana*"). An account I have received from the Darrang district states that the plant is of parasitic growth, and is found on several different kinds of trees, but that only plants found growing on the *kotholua* (scientific name unknown) tree are used in dyeing. The writer probably refers to the numerous different species of *loranthus*, of which 58 are known to be natives of India, and implies that only *Loranthus pentapetalus* is used in dyeing. The *leaves* are

employed in this process. They are pounded up and left for a night in water in an earthen vessel. Next day the cloth to be dyed is boiled in the mixture for an hour and then dried in the sun. It is then soaked in mud for about a quarter of an hour, and again dried in the sun, and is then found to have assumed a black colour. This process is practised chiefly by the women of the Jugi caste, who adopt it to dye their *mekhelas* black.

MAGENTA.—

Beng.—, *Ass.*— } Magentar, Marendar.

This dye is used in Goalpara, and is the only definite case I have come across of an aniline dye being used in the province. The crystals are powdered up, and a fleeting pale red is obtained by simply steeping the cloth or other article to be dyed with the powder in cold water. To obtain a fast dye, the cloth, etc., is boiled with the powder for about an hour. This gives a deeper red. The crystals are obtainable in most of the bazars in the province, as they are used largely by the Hindus at the time of the Holi festival; they are also used to some extent for making red ink.

MAGWŬ.—*Scientific name unknown.*

Angami Naga.—Magwŭ.

A name given to a tree found in the Naga Hills; the leaves are used to produce a brick red colour, known by the Angami Nagas as *roru*, *loyā*, and *lorā*. The process is as follows. The leaves are pounded up into a pulp with water. At first only a dirty yellowish colour exudes, and in this the cloth to be dyed is soaked. When well soaked, it is boiled with the roots of the *kwutho* tree. These roots are first scraped fine like a horse radish. When the colour assumes the required shade, the cloth is taken out and dried. When dry, the cloth is damped with rice-water, and this is said to make the colour fast; but it is somewhat doubtful if rice-water possesses this property (see under "*Oryza sativa*").

MALLOTUS PHILIPPINENSIS.—*Muell., Arg.; Fl. Br. Ind., V*, 442.

The Monkey-face Tree.

Beng.—Kamalaguri.

Ass.—Gangai, Puddum, Jaggaru.

"A small tree, from the fruit of which the dye is obtained. It gives a rich red colour, and does not require a mordant" (*Darrah*). Its use, however, would appear to be very limited, if it exists at all, for none of the district reports mention it.

MANGIFERA INDICA.—*Linn.; Fl. Br. Ind., II*, 13.

The Mango Tree.

Beng.—, *Ass.*— } Ám.

"The bark of the *mádhuriám* (*Psidium guaiava*) is boiled with the bark of the *hilika* (*Terminalia chebula* or *Terminalia citrina*), the mango, and the *jamu* (*Eugenia jamboolana*) to give a black colour" (*Darrah*). To these ingredients the *junialat* (scientific name unknown) is said to be added in Cachar. Black appears to be the only colour in the production of which the mango tree is used in Assam.

MARAGACHH.—*Scientific name unknown.*

A tree so called is used by the Phakials in the Lakhimpur district as an ingredient in a dye recipe (see under "*Strobilanthes flaccidifolius*").

MELASTOMA MALABATHRICUM.—*Linn.; Fl. Br. Ind., II.*, 523.

THE INDIAN RHODODENDRON.

Mech.—Panipiali.

The Meches of Goalpara use the leaves of this tree as a mordant, in combination with *Indigofera tinctoria*, madder, and turmeric, to produce a blue, a dull red, and a yellow, respectively.

MELIA AZADIRACHTA.—*Linn.; Fl. Br. Ind., I*, 544; *Wight, Ic., t.* 17; *Meliaceæ.*

THE NEEM, OR MARGOSA TREE.

Beng.—Nim, Nimgachh.
Ass.—Mahánim.

This tree is common all over the plains districts; but, though frequently used as a medicine, it is never used in dyeing.

MELIA AZEDARACH.—*Linn.; Fl. Br. Ind., I*, 544; *Wight, Ic., t.* 160.

THE PERSIAN LILAC, BEAD TREE.

Beng—Ghoranim, Mahánim.
Ass.—Thamaga.

This tree is reported to be common all over the Assam Valley, but is nowhere used as a dye.

MESUA FERREA.—*Linn.; Fl. Br. Ind., I*, 277; *Wight, Ic., t.* 117—119; *Guttiferæ.*

Beng—Nágesvar.
Ass.—Nahar.

"A middle-sized evergreen tree, the flowers of which are said to yield a mordant" (*Darrah*). The tree is common in the province; but none of the district reports mention its use for dyeing purposes.

MICHELIA CHAMPACA.—*Linn.; Fl. Br. Ind., I*, 42; *Wight, Ill., I*, 13, 14, *t.* 5, *f.* 6.

THE CHAMPAC.

Beng.—Champa, Champaka.
Ass.—Tita sapa.

A large evergreen tree, with sweetly-scented yellow flowers, which, when boiled, yield a yellow dye and communicate an agreeable perfume to the fabric. The use of the tree for dyeing purposes is, however, somewhat uncommon in the province.

MIMUSOPS ELENGI.—*Linn.; Fl. Br. Ind., III*, 548; *Wight, Ic., t.* 1586; *Sapotaceæ.*

Beng.—
Ass.— } Bakul.

A large evergreen tree common all over the Assam Valley; the bark gives a brown dye, but its use as a dye has not apparently been recognised except in the Darrang district; there, too, it is stated that it is no longer used for dyeing.

MITHÁ ÁM—*Scientific name unknown.*

Ass—Mithá ám (*mithá*=sweet, *ám*=mango).

Darrah mentions this as a plant the bark of which is used with those of the *hilika* (*Terminalia citrina*) and *jamu* (*Eugenia jambolana*) to produce a black.

MORINDA ANGUSTIFOLIA.—*Roxb.; Fl. Br. Ind., III*, 156; *Rubiaceæ.*

Bengali.—Dáruharidra
Ass.—Achhugachh, or Asukáth.
Phakial.—Kchaitun.
Garo.—Chenung, or Chengrong.
Naga.—Ntan.

This small tree is found practically all over the province, and it is one of the commonest dye agents in use in the Assam Valley, both by the Assamese proper and by the other tribes living in, and on the hills adjoining, the valley. The Garos, Nagas, and Khasis use it, but I have not come across any information to show that it is used in the Surma Valley. Used alone, the *bark* and *wood* give a yellow dye, but they are very rarely used to produce that colour: some other ingredient, which varies in different districts, is employed with it to produce various shades of red. Among the Assamese proper, the following is more or less typical of the process gone through: The cloth is first steeped in a mixture of water, mustard oil, and the ash obtained by burning plantain stalks. It is allowed to remain in the mixture for two or three days, in the course of which it is taken out once or twice and dried in the sun. The *twigs* of the *achhugachh* are then cut up into small chips, pounded, and mixed with the pounded bark of the *leteku* (*Briedelia sapida*) tree, and both are boiled together in water. When boiling, the cloth prepared as above is put in and boiled for about an hour, when it assumes a permanent red. The process among the Phakials has been described as follows: The thread having been steeped in mustard oil, or in oil obtained from a pig or elephant, is boiled for an hour or two, and then exposed in the sun to dry for 20 days. When thoroughly dry, it is washed and boiled with wood ashes in water and put out in the sun to bleach. *Roots* of the *achhugachh* are then cut up and pounded. Water and wood ashes are added, and, the thread having been placed in the mixture, the whole is warmed over a fire. It is then allowed to stand for a day, after which the thread is taken out and exposed in the sun. The shade of red depends on the number of times the thread undergoes the last steeping process and subsequent exposure. The oftener this is repeated the darker is the colour produced. This process is known in Sibsagar also, and it is reported that great care has to be exercised to see that the thread, after being steeped in the oil, is ready for dyeing. The test applied to ascertain this is to burn a small quantity of the thread; if the ashes are quite white, the thread is ready, if not white, the whole process of steeping and boiling is gone through again. It is further reported that in Sibsagar the *bark* is used as well as the *roots* in the process. From Dibrugarh it is reported that two varieties of trees are known as *achhugachh*, one yielding a red and the other a yellow dye, and that the one yielding red is the only one used in dyeing. This is probably a mistake, the same tree yielding both colours according to the process employed. In Dibrugarh, *máját hi*, or madder (which variety is not stated), is used to make the colour a deeper red, and the *roots*, and not the *twigs*, of *achhugachh* are employed. The proportion of the ingredients is thus given: Pounded *achhugachh* roots 4 parts, *mijáthi* 1 part, mustard oil 8 parts, water or ash water (*khárpáni*, *q.v.*) 8 parts. It is said that an iron or brass utensil may be used in the process. The thread is placed in these ingredients and warmed for two or three hours over a slow fire and then exposed to dry in the sun. The process is repeated for three consecutive days. The *májáthi* is sometimes omitted, and then a pale red is obtained. In the North Lakhimpur subdivision, a deep red is obtained by mixing lime with the pounded *roots* and *bark* of the *achhugachh*. In Nowgong, the process is almost the same as that first described above. The colour, however, is sometimes brightened by boiling the cloth or thread, which has already been dyed, as described, for two hours in water with a *chittak* of *májáthi*. In Goalpara, a seer of pounded chips of the *bark* and *roots* is boiled in 5 or 6 seers of water. This suffices to dye 2 seers of yarn a pale red. Sometimes the *leaves* of the *leteku* (*Bace. sapida*) are said to be used partly as a mordant and partly to make the colour a deeper red. In Darrang both cloth or thread are dyed with *achhugachh*. Only the *wood* is used. One-eighth of a seer is pounded up and boiled in 2 seers of water; the thread or cloth is boiled in the mixture for two hours, and while boiling 2 *tolas* of *leteku* bark are thrown in as a mordant. No mustard oil, or plantain ash, is used. The red colour so obtained is rendered more permanent by subsequently boiling the article with *bharathi* and *amchángala* as in the case of lac (*vide* "*Coccus lacca*").

MORINDA CITRIFOLIA.—*Linn.; Fl. Br. Ind., III*, 155.

THE INDIAN MULBERRY.

Beng.—} Áchhu
Ass.— }
Cachar.—Jeng, Ganang, Yader.

This tree is found in the Assam and Surma Valleys; but, though it has been described as much the most important form, economically, of *Morinda*, the only instance of its use in dyeing in Assam is reported from Cachar, where it is used with linseed oil (*Linum usitatissimum*) and *khárpáni* (charcoal water) to produce a red. (See also under "*Morinda tinctoria*.")

MORINDA TINCTORIA.—*Roxb; Fl. Br. Ind., III*, 156.

AL DYE (A CLASS OF MULBERRY).

Beng.—Dáruharidra, Ách.
Ass.—Asukáth.
Khasi. LÁrnong.
Garo.—Gisák.

This variety of *Morinda* is found in the province; but it should be stated that the confusion that has existed hitherto in respect of the different varieties has probably crept into the descriptions furnished to me. *Morinda persicæfolia*, and *M. umbellata* have not been assigned separate places in this list, though both are found in the province, and are probably used in dyeing: but the accounts received left room to doubt if they had been accurately identified, and I have refrained from publishing them. The commonest form of *Morinda* used in Assam is undoubtedly *M. angustifolia*; the other varieties, when used at all, are used chiefly by the hill tribes, especially the Khasis and Garos. For an account of the use of *M. tinctoria*, see under "*Nei*" *infra*. It seems desirable that much of the confusion regarding the different varieties known in the vernacular by the generic name *ách*, or *áchhu*, should be cleared up, and I can only regret that the paucity and defective nature of the specimens supplied to me have not enabled me to do much towards this end.

MORINGA PTERYGOSPERMA.—*Gærtn.; Fl. Br. Ind., II*, 45; *Wight, Ill., t. 77.*

THE HORSE-RADISH TREE.

Beng.—Sajina, Sojna, Sujuna.
Ass.—Sajana

Common in the Assam Valley, but not used for dyeing. In the West Indies the wood is used for dyeing a blue colour.

MUSA SAPIENTUM.—*Linn.; Kurz.*

THE BANANA OR PLANTAIN.

Beng.—Kala
Ass.—Kal.

This is the common plantain, and the ash obtained by burning the stalk is used very extensively as a mordant in various dyeing recipes. The ashes are usually spread on a *kharáhi* or bamboo sieve, and then water is gently sprinkled over them until they have absorbed as much moisture as they can, they are then allowed to stand for a short time, and then the sprinkling is recommenced, the liquid being allowed to percolate through the ashes into a receiving vessel below. This liquid is called *khárpáni, lit*: ash water; if the ashes be simply soaked in water the whole is called *khárani*. In Upper Assam, *khárpáni* so prepared is used pretty generally as the liquid from which all dyes are prepared; that is to say, that when *water* is spoken of, this *khárpáni* is meant. Frequently, *madh*, or fermented rice beer, is added to the *khárpáni*, with which dyeing is about to be undertaken (see under "*Oryza sativa*"). The words *khárpáni* and *kháraní* do not, of course, apply exclusively to ashes derived from plantains; they are used for any ashes. The method of preparation, however, is the same, whatever kind of ash be used.

NEI.—*Scientific name unknown.*

Khasi.—Nei.

"Imparts a good red dye if the following process is used: Pound the seed of the *nei* plant to a powder and place it with the uncoloured yarn in a vessel. Fill the vessel with hot water, and then take out the yarn and dry in the sun. Repeat this process daily for a week. Then pound well the bark of the *lapongdong* (*Symplocos racemosa*) tree and the bark of the root of the *larnong* (*Morinda tinctoria*) and mix the powders well together, one pound of each, in a vessel of hot water. Then put in the yarn, and, after letting it steep, take it out and dry in the sun till it becomes hard; wash then with hot water, and repeat the process" (*Darrah*).

NIRI.—*Scientific name unknown.*

Garo.—Niri.

This is a name given to a tree by the Garos. They use the leaves to produce a blue dye: "The leaves are soaked in cold water for about a week. The refuse is then thrown away, and the thread to be dyed is then put into the solution. No alkali is used. The thread is then boiled till most of the water is evaporated. It is then washed in cold water and dried. This process is repeated three times, a fresh solution being made use of each time."

NYCTANTHES ARBOR-TRISTIS.—*Linn.; Fl. Br. Ind., III,* 603; *Aleaceæ.*

HARSINGHAR.

Beng.—Sephálika, Singhar, Narsinghar.
Ass.—Sewali.

A large shrub, with rough leaves and yellow, scented flowers, found in both the Assam and Surma Valleys. In Sylhet, the process employed in dyeing with the plants is as follows: Take half a seer of the corolla tubes of the flowers and boil them in 5 seers of water till the volume is reduced to about 4 seers. Then put in 1 chittak of nitric acid. The result is a permanent orange colour. If only half a chittak of nitric acid be used, the result is a much lighter orange. If the orange thus obtained is really a fast colour, the above process is interesting, because hitherto no means of rendering the colour fast has been discovered, or rather published. The plant is known in the Assam Valley, but its use as a dye appears to be confined to the Darrang district, and even there it is reported to be becoming rare. It is used in Darrang occasionally to dye silk thread. The corolla tubes are kept in water—it is not stated whether the water is hot or cold—for six hours, when the water becomes quite yellow. The thread is then put into the water and kept there for six hours, and is then taken out and dried; when dry, it is a deep yellow. This account is remarkable, inasmuch as boiling does not enter into the process at all; no mordant is used, and I presume the colour obtained is not a fast one.

ODINA WODIER.—*Roxb.; Fl. Br. Ind., II,* 29; *Wight, Ic., t.* 60; *Anacardiaceæ.*

Beng.—Fiol, Bohar.

This tree, the bark of which yields a small amount of brownish red colouring matter, is found in the province, but does not appear to be used for dyeing purposes.

OROXYLUM INDICUM.—*Vent.; Fl. Br. Ind., IV,* 378; *Wight, Ic., t.* 1337; *Bignoniaceæ.*

Beng.—Sanpatti, Nasona, Sona.
Garo.—Kering.
Rajbangshi.—Soirong.
Mech.—Cherpong.

"A small tree, the bark and fruit of which are believed to be used as a mordant" (*Darrah*). I have not been able to ascertain how far this belief is well founded. None of the district reports refer to its use in dyeing.

ORYZA SATIVA—*Linn.; Roxb., Flor. Ind., C. B. C.*, 306.

RICE.

Beng.—Chál

Ass.—Chául (husked). Dhán (unhusked).

	Ao.	Angami.	Kachha.
Naga.—	Rice = zang.	Seko lāko.	Shibi shibi.
	Dhán = tsük.	Telhà.	Jeo.

Garo.— Rice = merong. Dhán = mi giloginang.

Kachari.— Rice = mairang. Dhán = mai.

Khasi.— Rice = u khâw. Dhán = u kyba.

Lushai.— Rice = bûfai. Dhán = bûhûm.

Miri.— Rice = ûm'buin. Dhán = 'ûm.

Singpho.— Rice = mam. Dhán = n'gû.

Abor.— Rice= ûm'buin. Dhán = ûm.

It is said that a dye is obtainable from rice-husk. I have not been able to find cases of its being used in Assam for its colouring properties, but in the accounts given above of the *magwü* and *lakedema* dyes, it will be seen that rice forms an ingredient in certain dye recipes in use in the province. In the case of the *magwü*, the Nagas are said to claim that the rice-water acts as a mordant. It would be interesting to know how far this is correct; none of the authorities I have consulted refer to it as possessing any properties as a mordant. The account given above under *Carthamus tinctorius* of the Manipuri process of producing a pink dye, mentions the use of paddy husks as an ingredient in the process.

OSAK.—*Scientific name unknown.*

Ao Naga.—Osák.

The following account of this plant has been supplied me by the Rev. E. W. Clarke, a missionary working in the Mokokchang subdivision of the Naga Hills: "The Ao Nagas colour a dark blue with *osák* leaves. This *osák* is probably an indigo plant. It is a perennial shrub that abounds in the vicinity of Ao villages, and sometimes small patches of the plants are seen long distances from any house. Of the many plants I have seen, I do not think any of the bushes were over 3 feet or 4 feet high. It is easily propagated by cuttings; the older bushes not unfrequently throw down tendrils from the lower branches a few inches from the trunk, and these tendrils may take root in the earth. The Aos cultivate the *osák* only for the leaves to dye with. The dyeing process is as follows: The leaves having been plucked are pounded to a pulp. This is usually done by the rice-pounding pestle in an old pig trough. This pulp is spread thinly in the bottom of a large shallow basket and put in the attic of the front part of the Naga dwelling house to dry, during which there may be some fermentation or decomposition, as maggots sometimes appear in the stuff while damp. This pulp is kept in the basket in the attic for a month or two, until it has become thoroughly dry. Then it is put into a large wooden vessel (or an iron vessel if the family have one), water is poured on freely, and the mass soaks for three days. On the third day a considerable quantity of wood ashes is put in and the mass well mixed. At evening the cloths to be dyed are well *buried* in the mixture (this dyeing is called burying), and allowed to soak one night. In the morning, the cloth or cloths are wrung out and hung up on a line or pole, the ashes or other refuse attached will be rinsed off with cold water, and the cloths will be allowed to dry. To get a satisfactory colour, this process of submerging at night and drying

in the day time may be repeated once or twice, but the cloth is allowed to remain in the dye but one night at a time. (Old cloths may be re-dyed by cooking them in the above dyeing material, but new ones are not cooked in it.) When the cloth has been thoroughly and evenly dyed as above, then fresh *osák* leaves are plucked, and without pounding are put into a pot with water, and in this the cloth is cooked one day, when the cloth is taken out and dried. This process may be repeated two or three times with fresh *osák* leaves every time, in order to secure a nice, bright finish."

OXALIS CORNICULATA.— *Linn.*

The Indian Sorrel

Ass.—Changeri tenga.

In Nowgong this weed is used as a mordant for practically all the dyes used in that district. The leaves are boiled, and the article to be dyed is boiled along with them for half an hour, and then taken out and dried in the sun, after which it is submitted to the dyeing process required.

PANISEKATI LATA.—*Scientific name unknown.*

A creeper (*la'a*) so called in the Nowgong district, where it is used for dyeing split bamboos black. It is described as having leaves like the *teteli* (*Tamarindus indicus*), and is found all over the district. As a matter of fact, I understand that the plant is common in other districts in the Assam Valley, and is used in the same way and for the same purposes as in Nowgong. The leaves are thoroughly pounded up. The pieces of bamboo which it is desired to dye are then placed between two layers of the pounded leaves in an earthen vessel (*chárú*). Water is poured on gently and then the whole is boiled for about an hour. The split bamboos are then taken out, and in the evening allowed to soak in mud. Next morning, they are taken out, washed and dried in the sun, and are then found to have assumed a black colour. This process is gone through chiefly to get coloured bamboos to form parts of ornamental fans, mats, and *jhápis*. *Jhápis* are the well known head-coverings in vogue amongst the Assamese villagers, and are used as a protection against sun and rain. Those in common use are generally quite plain and small. But Gosains, and the women-kind of the better classes, use enormous ones, sometimes 5 or 6 feet in diameter, and frequently highly ornamented with coloured bamboos and embroidered wool work.

PAOLIKÁET.— *Scientific name unknown.*

Ass.—Paolikáet, Palikátá, Haldiakáth, Pulikáth (Darrang).

"This plant, when pounded and boiled with the yarn to be dyed, imparts to the latter a brown colour. The roots, when powdered and boiled with the thread, give a yellow colour, which is fast" (*Darrah*). It is reported from the Mangaldai subdivision of the Darrang district that the plant grows in the hills adjoining that subdivision as well as in the plains. The process employed to extract the yellow dye in Mangaldai is as follows: The plant is cut into chips and then well powdered; the powder is soaked in water in an earthen vessel (a metal vessel must not be used), the proportion being 2 or 3 seers of the powder to 10 or 12 seers of water. The mixture is allowed to stand for two or three days, and then about a seer of *eri* thread is steeped in it and boiled for one-and-a-half hours. It is then allowed to stand all night, and next day the thread is taken out, wrung out, and dried in the sun. If the required shade of yellow is not obtained, the whole process is repeated. Another account states that this plant is used, but very rarely, to dye cloth also. It states also that in dyeing thread, *leteku* (*Baccaurea sapida*) bark is used with *pulikáth* as a mordant.

PERILLA OCIMOIDES.—*Linn.*

Hind.—Bhanjira.
Manipuri.—Thoiding.
Naga.—Kenia

A coarse aromatic herb found in Manipur and used extensively by the Manipuris to produce a black dye. The process was described by the late Major Trotter as follows: "A quantity of *thoiding* to be fried and mashed up into a paste; take 5 tolas of this paste and mix in 2 quarts of water; then, after washing the cloth to be operated on perfectly clean, steep it in the mixture, pressing and moving it about for about five minutes; then take out and wash thoroughly in clean water and spread out in the sun till dry; then mix 5 tolas of *thoiding* paste with 2 quarts of lye prepared from the ashes of the *kairang* tree, and steep the cloth in this mixture; when thoroughly steeped, wring out and dry in the sun; when dry, again repeat this process. Now pound ¾ of a seer of dried young leaves of the *chingjagu* (teak) tree, mix 8 quarts of water with it, and boil, stirring gently the while; steep the cloth *in 2 quarts of kookee water (this water is to be prepared as follows for this dye: fill a pot* ¾ full with *koohee* bark and pour in enough water to submerge it, then put the pot on the fire till the water simmers, when it will be ready for use), and put into the pot and boil it thoroughly in the mixture of *chingjagu* leaves and water, moving it in and out the while; then wash in clean water, and dry in the sun. If the cloth is found not to have taken the proper colour, then the entire process, as above, must be repeated.

PERISTROPHE TINCTORIA.—*Nees.; Fl. Br. Ind., IV*, 556.

Beng.—} Rang, Bet, or Betiarang.
Ass. —}

An erect spreading herb, found in Sylhet and used there for dyeing, though to what extent, and in what manner, has not been reported. *McCann* says it is used in Bengal exclusively in dyeing the sticks from which *masland* mats are manufactured.

PHUTLÁNG.—*Scientific name unknown.*

Kachari.—Phutlang.

It is reported from Kamrup that the Kacharis in that district extract a yellow dye from a plant known to them under this name. The plant is available about the month of *Agrahâyan*. It is pulled up and kept in the house for two days. The leaves are then pulled off and put in the sun till they are half dried. A layer of the leaves in this state is placed in a vessel with water, then two or three skeins of yarn are laid on top of the leaves; if necessary, another layer of leaves and another of yarn can be added, and so on until the vessel is half full. The whole is then boiled until the yarn assumes the desired tint of light yellow. It is then taken out and dried in the sun. No mention is made of the use of any substance as a mordant. The colour is often deepened and rendered more brilliant by subjecting the yarn dyed with *phutlâng* alone to a similar process with the wood of the *kulikâtagachh* (*vide supra*). This plant is known also as *phutki*, and is probably the same as the common *phutuka* found growing wild all over Upper Assam, and popularly called "the wild rhododendron."

PHYLLANTHUS EMBLICA.—*Linn.; Fl. Br. Ind., V*, 289; *Wight, Ic., t.* 1896.

The Emblic Myrobalan.

Beng.—Ámlaki.
Ass.—Ámlaki.
Garo.—Ambári.
Khasi.—Sohmyrlain.

A moderate-sized deciduous tree, common in the Assam and Surma Valleys, and in the Khasi and Garo Hills. Alone, the fruit gives a blackish grey dye, but it is generally

used, like other myrobalans, with salts of iron, or the barks of other trees, to produce a black. The bark and leaves are similarly employed and give the same colours as the rui t. In the Jorhat subdivision of the Sibsagar district, the barks of this tree are used with those of the *hilika* (*Terminalia chebula* or *Terminalia citrina*), *jamu* (*Eugenia jambolana*), and *madhuriám* (*Psidium guaiava*) to produce a black. The barks are mixed in equal parts and pounded together into shreds. They are then boiled in water; when boiling point is reached, the cloth or other article to be dyed is put in and left to boil for an hour or so. It is then taken out and dried in the sun. When dry, it is again immersed in the vessel containing the dyeing mixture, which is cold by that time, and again dried. The process is continued until a black is obtained. In Sylhet, the Tipperahs and Manipuris arrive at a similar result without the use of the bark of the *mádhuriám*, the other ingredients being the same. In Lakhimpur, a black is obtained by mixing the pounded barks of the *hilika*, *ámlaki*, and *jamu* with sulphate of iron.

PLANTAGO MAJOR.—*Linn.; Fl. Br. Ind., IV*, 705.

Hind.—Luhuriya.

A large herb, found in the Khasi Hills, the root and leaves of which contain a red colouring matter; the plant is not known to be used for dyeing purposes by the Khasis.

POLYGONUM HYDROPIPER.—*Linn.; Fl. Br. Ind., V*, 39.

The Water Pepper.

Beng.—Packur-mul.

Found in ditches and wet places in Sylhet, and can be used to dye wool yellow. Its use as a dye is unknown in the province.

PONGAMIA GLABRA.—*Vent.; Fl. Br. Ind., II*, 240; *Wight, Ic., t.* 59; *Leguminosæ.*

The Karanja Tree.

Beng.—Karanja, Khawari, Karmuj.

This tree is found in Sylhet, but is not used for dyeing.

PSIDIUM GUAIAVA.—*Linn.; Fl. Br. Ind., II.* 463; *Myrtaceæ.*

The Guava.

Beng.—Piyára.

Ass.—Mádhuriám.

The common guava tree, cultivated largely for its fruit. The bark and leaves are very commonly used in Upper Assam, generally with other ingredients, to produce a black. *Terminalia citrina* or *chebula*, *Phyllanthus emblica*, and *Eugenia jambolana* are the commonest products used in combination with *Psidium guaiava*. In Kamrup, the pounded leaves are used without any other ingredient to produce a black. The yarn or cloth is simply boiled with the pounded leaves, and, when cool, placed in liquid mud for an hour or so, after which it is washed and dried in the sun. In Nowgong, a black is obtained (*a*) by boiling the cloth with the bark of the guava and *amara* (*Spondias mangifera* ?), and (*b*) by boiling the pounded leaves and bark of the guava alone with the cloth. In Darrang, the process is the same as in Kamrup, except that the bark is sometimes mixed with the leaves. The bark and leaves are also used in Darrang by fishermen to colour their nets.

PUNICA GRANATUM.—*Linn.; Fl. Br. Ind., II*, 581; *Wight, Ill., t.* 97; *Lythraceæ.*

THE POMEGRANATE.

Beng.—Dálimgachh.
Ass.—Dálim.

In the Sibsagar district the bark of the pomegranate and lemon (*Citrus medica*) trees are boiled with iron filings to dye yarn black. This is the only case I have come across of the shrub being used in dyeing in the province.

QUERCUS FENESTRATA.—*Roxb.; Fl. Br. Ind., V*, 608; *Wight, Ic., t.*

Beng.—Kalachakma.
Manipuri.—Koohee, or kuhi.
Khasi.—Dingjing.

The bark is used in Manipur with other ingredients to dye cotton black (see under "*Perilla ocimoides*" and "*Strobilanthes flaccidifolius*"). The process for dyeing silk black is as follows:—Pound the leaves of the teak or *chengjagu* tree and keep them in water for 24 hours; then strain the mixture by squeezing through a strong coarse cloth. Pound some *kuhi* bark and soak it in water for 24 hours. Then mix this decoction with the other prepared from teak bark in the proportion of 1 to 3. A piece of silk which has previously been dyed blue (=*hikok*, see under "*Strobilanthes flaccidifolius*") is then boiled for half an hour in the mixture, taken out, allowed to cool, and then washed clean. It is then wrung out and dried in the sun. The silk is then rubbed and squeezed in the *kumna* (*Strobilanthes flaccidifolius*) decoction for another half hour, wrung out, and dried as before. The result is a black dye, called by the Manipuris *amuba*.

QUERCUS PACHYPHYLLA.—*Kurz.; Fl. Br. Ind., V*, 608; *King Ann. Bot.*

An evergreen tree or shrub found in Manipur between 7,000 and 9,000 feet. "In Sikkim, this forms a magnificent tall tree; but on the eastern frontier of Manipur, Dr. Watt found it only as a bush, a singular variation in habit, within limits so narrow, and under climatic conditions so similar" (*King*). The bark and acorns are said to be used in Manipur for dyeing and tanning. "If this be so, the Naga Hills might afford an unlimited supply, since the higher forests of Manipur are covered with miles upon miles of this species of oak, mixed with *Quercus dealbata, Quercus lamellosa*, and *Quercus ilex*" (*Watt*).

RANDIA DUMETORUM.—*Lamk.; Fl. Br. Ind., III*, 110; *Wight, Ic., t.* 580—583; *Rubiaceæ.*

Beng.—Menphal, Madan.
Ass. (*Rajbangshi*).—Gurol.
Mech.—Gundrow.

This tree, the fruits of which are used up-country as a colour intensifier, is found in Sylhet and the Lower Assam Valley, but no part of it is used in dyeing in the province.

RANDIA ULIGINOSA.—*D. C.; Fl. Br. Ind., III*, 110; *Wight, Ic., t.* 397.

Beng.—Piralo.

This tree, the uses of which are similar to those of *Randia dumetorum*, is also found in Sylhet, but is not used in dyeing.

RASPÁT.—*Scientific name unknown.*

Ass.—Raspát.

I have been unable to procure specimens, susceptible of identification, of this plant, which is known by this name both in the Assam and Surma Valleys, and appears to be indigenous to both. In the Sibsagar district, its leaves are boiled with the yarn to be dyed, and sometimes lemon juice or (the bark of ?) *leteku* (*Baccaurea sapida*) is added as a mordant; a red is the result. In Nowgong, a similar process is gone through to colour split bamboo for use in making coloured fans, mats, *jhapis*, etc. It is not stated whether the plant is used for dyeing or not in the Surma Valley.

REPO.—*Scientific name unknown.*

Angami Naga.—Repo.

The bark of this tree is used by the Nagas with those of other trees to produce a black (see under "*Juglans regia*"). It is probably a myrobalan.

RICINUS COMMUNIS.—*Linn.; Fl. Br. Ind., V*, 457; *Bot. Mag. No.* 2209; *Euphorbiaceæ.*

The Castor-oil Plant (*Palma Christi*)

Beng.—Bherenda.

Ass.—Eri.

This plant is very commonly cultivated in the province, especially in the Assam Valley; but, though used in other provinces as an auxiliary in dyeing, its use for that purpose appears to be unknown to the Assamese. It is chiefly grown to feed the *eri* silkworm upon its leaves, and for its medicinal properties.

RUBIA.—*Linn, Gen. Pl. II*, 149.

Till recent years only two varieties of *Rubia*, found in the province, have been generally recognised as distinct species, *viz.*, *Rubia cordifolia*, and *Rubia sikkimensis*. The article on the former in the "Dictionary of the Economic Products of India" explains Dr. Watt's theory regarding the subdivision of this species into two varieties—*Rubia cordifolia* proper, and *Rubia khasiana*. Dr. Watt thinks that the latter is by far the most valuable dye-yielding variety. Specimens were sent to him last year by the Director, Department of Land Records and Agriculture, Assam, with a view to their being chemically examined at the Imperial Institute. The result of the examination is not yet known, but if Dr. Watt's estimate of the properties of *Rubia khasiana* be fulfilled, there is some hope of its being able to compete with the European madder (*Rubia tinctorum*) which the Indian varieties have never yet been able to do. It is unfortunate that the greatest confusion has existed hitherto in distinguishing even between *Rubia cordifolia* and *Rubia sikkimensis*. They have both been called by the same vernacular names in several languages: the reports, therefore, from district officers, based, as they are, to a very great extent either on reports submitted to them in, or on enquiries made in, the vernacular, cannot be relied on for any deductions which may be sought to be drawn between these two species. As for *Rubia khasiana*, it was unknown to district officers till lately, and has been called *Rubia cordifolia* and *Rubia sikkimensis* indiscriminately, so that it would be still more unsafe to come to any conclusions on the materials supplied to me about this variety. It may be stated, however, that a specimen of *Rubia*, said to be *Rubia cordifolia*, and submitted as such by the Subdivisional Officer of Jowai in the Khasi and Jaintia Hills district, was pronounced by Dr. Watt to be *Rubia khasiana*: and on this fact being communicated to the Deputy Commissioner of the district, he replied that *Rubia cordifolia*, as distinguished from *Rubia khasiana*, was not to be found in the Khasi Hills. From this a conjecture may be hazarded, though it cannot be more than a conjecture, that the madder used by the Khasis

and by the people in the plains of Kamrup, etc., whom they supply with it, is principally of the variety *Rubia khasiana*.

Under the circumstances stated above, it has been decided, as in the case of *Curcuma*, to collect all the information received in connection with this monograph about madder under one head,—*Rubia cordifolia*; and, unless otherwise specially stated, it must be understood that the remarks under that variety may refer to either of the others.

RUBIA CORDIFOLIA.—*Linn.; Fl. Br. Ind., III*, 202; *Wight, Ill., t.* 128, *bis. F. I., also I, ct.* 187; *Rubiaceæ*.

Beng.—Manjit.
Ass.—Májáthi.
Manipuri.—Moyum
Angami Naga.—Chenhu, Senhi.
Lhota Naga.—Enhu.

(*Vide* under "*Rubia*" *supra*.")

Var. I, Cordifolia proper.—*Leaves* 4 in a whorl, more or less cordate, on petioles not more than one inch long; generally 5 costate, rarely 3, veins impressed, surface rough and hispid.

Var. II, Khasiana.—*Diagnostic characters.*—Leaves on petioles, generally 1, 1½, or 2 inches long; 3 costate, rarely 5, often almost with solitary mid-rib, smooth, not hispid and veins not impressed (*Watt*).

This perennial creeper is found practically all over the hills of the province and in Manipur in a wild state. The hill people carry it to the plains and sell or barter it among the plains people for use in dyeing. They also use it very largely themselves for the same purpose. Alone, madder produces shades of red, but it is also used in combination with other substances to produce reds and yellowish reds. In Lakhimpur, *májáthi* is used with *achhu* (*Morinda angustifolia*), mustard oil, and ash water to deepen the red obtained by the use of these three latter ingredients alone (see under "*Morinda angustifolia*"). In the North Lakhimpur subdivision, it is used both with the leaves of the *bhomrati* (*Symplocos spicata* or *racemosa*) and alone to produce a red. In all three cases the whole plant seems to be cut up into small pieces and steeped in water, and the cloth, etc., boiled in the infusion. In Sibságar, so far as my enquiries have gone, the use of madder in dyeing appears to be quite unknown. This is somewhat remarkable, seeing that the district is bounded for the greater part of its length on the south by the Nága Hills, among the inhabitants of which madder is one of the most commonly-used dyeing agents. In Nowgong, cloths which have been dyed red with *achhu* are subsequently boiled for a couple of hours in water with a chittak of *májáthi*; this is done to brighten the red. In Darrang, the people get madder from the Dafla Hills, but do not use it alone. They appear to employ it to deepen the red obtained from other dyes. It is boiled with *bhomrati* leaves to produce a red. Some time before putting it into the infusion so produced, the cloth is boiled in a decoction of pounded *achhu* wood mixed with dry *bhomrati* leaves: a red is the result. In Mangaldai, it is used with *Coccus lacca* (*q.v.*) to produce a red. In Kamrup, the people get their madder from the Khasis on the south bank and from the Bhutias on the north. It is used alone, and with the following process yields reddish yellow: Dry a quantity of the creeper in the sun, pound it and soak it in water for a day, boil it with the yarn to be dyed, and then put in the sun to dry. Madder is also used with lac and the pounded leaves of the *bhoira* (scientific name uncertain), *barthekra* (*Garcinia pedunculata*), and *leteku* (*Baccaurea sapida*) trees to produce a red. The yarn is first soaked for three days in the juice obtained from the pounded leaves, and then boiled in an earthen vessel with the lac and madder. In Goalpara, small bundles of *májáthi*, previously cut into small pieces and dried, are

occasionally brought down from the hills by the Meches, who are employed as woodcutters by timber traders. The bundles, which weigh from half a seer to a seer, are sold at from 2 to 4 annas each, and two medium-sized bundles are sufficient to dye 2 seers of thread. The *máfathi* is pounded and boiled in water with the thread for an hour or so, and then the thread is wrung out and dried in the sun. The process is repeated till the desired depth of colour is obtained. It is resorted to chiefly in dyeing *endi* thread. In Manipur, the *mayum* used is stated by Dr. Watt to be undoubtedly *Rubia sikkimensis* (*q.v.*). For the use of *mayum* in Manipur, *vide* under "*Bixa orella*" *supra*.

The use of madder in dyeing is apparently unknown in the Surma Valley districts, at least, the reports I have received make no mention of it. It is open to doubt, however, whether the large colony of Manipuris settled in Sylhet and Cachar do not make use of a dye which is the most commonly used to yield red in their own country. The process, however, would probably be the same as that described under "*Rubia sikkimensis*" below.

Dr. Watt went very fully into the question in 1883, and, as he was the pioneer in the examination of the *Rubia* of Assam, and his discoveries must form the basis of any further enquiry on the subject, no apology is needed, in view of the importance of the subject, for quoting some of his remarks on the subject of *Rubia cordifolia*: "During the Burma-Manipur Boundary Commission I observed that one of them yielded the red-colouring matter more freely and more abundantly than the other. On returning to Calcutta, I found this observation fully confirmed on referring to the excellent set of sheets in the Herbarium of the Royal Botanic Gardens. All the sheets bearing specimens of the better dye-yielding form were coloured through and through, while only one sheet of the other form showed the slightest tendency to discolour the paper upon which it was mounted. In fact, in this respect the true madder (*R. tinctorium*) seemed inferior to the dye-yielding form of *R. cordifolia*.

"*1st Variety, Cordifolia proper.*—This is the form chiefly met with on the Himalayas, appearing near the Chenab and extending eastward, to Sikkim and Bhutan, altitude 8,000 feet, to the Khasi and Naga Hills, Burma, South India, and Ceylon. It seems nowhere to be cultivated, but is largely collected as a wild dye stuff and carried to the plains to be sold. The root and lower or ground twigs are the dye-yielding portions. This form I regard as inferior in dye-property, although it is the one generally used in India and sold as madder.

"*2nd Variety, Khasiana, Watt, Ms.*—This form is the richest in madder dye-principle. It is occasionally met with in Sikkim, but attains its greatest development eastward in the Khasi and Naga Hills. It seems nowhere to be met with to the west of Sikkim. I repeatedly collected this form and compared it with the true *R. cordifolia*, thinking that it would probably be found to possess characters sufficient to justify its entire separation from *R. cordifolia*, if not its identification with *R. manjista* (*Roxb.*). But, while arriving at the conclusion that it was probably only a variety of *R. cordifolia*, I satisfied myself as to its superior dye-yielding property. I had been struck with the perfection of the red dye with which the Nagas colour the hair decorations of their spears, etc., and I at first concluded that this was the plant from which they obtained it. I was soon after convinced, however, that neither of these supplied the favourite red, but a third plant which I was shown, namely, *R. sikkimensis* (*Kurz.*). Before proceeding to discuss this interesting discovery, I venture to repeat my conviction that *var. khasiana* is a far richer dye-yielding plant than the ordinary *R. cordifolia*. I am inclined to suspect that the experiments which were once made with a view to discover whether *R. cordifolia* in a cultivated form could compete with the European madder, may have failed, because this inferior variety was experimentally cultivated. If it happened that a consignment of *var. khasiana* reached Europe, it is likely that its richness in dye-property suggested the idea that the cultivation of *R. cordifolia* would be as profitable as that of *R. tinctorium*, and that disappointment followed from experimenting with the ordinary north-west Himalayan form. These remarks are, however, mere suggestions, made in the hope that some additional information may be elicited from Eastern Bengal."

RUBIA SIKKIMENSIS.—*Kurz.; Fl. Br. Ind., III*, 203.

[Vernacular equivalents as for *R. cordifolia*.]

Under this variety, I cannot do better than quote *in extenso* the remarks made by Dr. Watt in 1883 in his "List of Dyes, Tans, and Mordants of India."

"*Diagnostic characters.*—An extensive sub-woody climber; branches retrorsely scabrid; leaves 3 to 6 by 1 to 2 inches, *sessile or nearly so*, 4 in the whorl, elliptic or ovate lanceolate, 3, rarely 5, costate.

"This is the largest and most handsome species in the genus, growing along the ground and over bushes and small trees, with branches often 3 to 4 yards long, and the whorls of leaves as much as a foot apart. It makes its appearance in Sikkim, but attains its greatest development in the Khasi and Naga Hills, where it is perhaps the most common species. Apparently, the Lepchas of Sikkim do not know that this plant yields the madder dye, but I suspect that the thick heavy roots (many times thicker than the roots and twigs of *R. cordifolia*) which are sold in the bazars belong largely to this species, though probably used as an adulterant. This seems to be strengthened by the fact that until 1874 the plant was not named or even known to exist. Specimens had, of course, been collected, but they escaped attention, having remained for many years in the larger Herbaria unpublished. In the Naga Hills and in Manipur this species alone supplies the brilliant red dye used by the hill tribes to colour their cloths, hair decorations for spears, shields, and earrings, rings, etc., as well as to colour their cane and bamboo plaited work.

"The process of extracting the dye is curious. It was shown to me after considerable trouble. A woman came one morning to the Residency, Manipur, bringing with her the following things:

"1*st*.—Two or three bundles of root and stem of *R. sikkimensis* (*Kurz.*).

"2*nd*.—A slab of the bark of *Alnus nepalensis* (*D. Don*).

"3*rd*.—A bundle of twigs and leaves of *Symplocos racemosa* (*Roxb.*).

"4*th*.—A packet of seed, and a specimen of the plant yielding these seeds, which I identified as *Leucas cephalotes* (*Spreng.*), a labiate plant common in the fields throughout India, and in Bengal I have been told it yields an oil used for illuminating purposes. I can, however, find no mention of this oil in works on Indian Economic Botany, and I shall be greatly pleased to learn if other observers have noted this property, as it seems to be intimately associated with the separation of the madder from *R. sikkimensis*. In Bengal, *Leucas cephalotes* is generally known as *bura-hul-khusa*, and in Madras as *gurosatumi*, Tel. (see *Roxb.* Fl. Ind., Ed. C. B. C., p. 461, *Pholmis cephalotes*, *Kon*.)

"5*th*.—Two skeins of cotton thread, one of which was of a yellow colour, and had been prepared beforehand by a process which I was to see applied to the second one. It had been steeped in some mordant or metallic salt.

"6*th*.—Two earthen vessels.

"7*th*.—A small basket.

"I was told that it was necessary first to prepare the second skein of cotton, so as to give it time to dry, in order that it also might, if possible, be dyed. The woman sat down and set fire to the bundle of twigs and leaves of *Symplocos racemosa*. When completely burned to ashes, these were carefully collected and placed in the corner of the basket, and a little water sprinkled over and allowed to soak for a few minutes; then more water was sprinkled, until ultimately a yellowish liquid began to strain through and trickle into one of the earthen vessels. This liquid tasted bitter, and no doubt contained some alkali salt, which I have not as yet had time to identify chemically. When enough liquid had thus been obtained, the second, or unprepared, skein of cotton was placed in the vessel and boiled for some time; after which it was removed, wrung out and hung up to dry.

"The second process was then proceeded with. The woman and her assistants commenced to pound the chips of *Rubia*, using about equal proportions of root and stem. When this had been done, the powder was mixed (about one-fourth as much as powdered madder) with a handful of the seeds of *Leucas*, and intimately combined and rubbed

together by the hand on a stone. This mixture was then placed in the other earthen vessel and boiled with about three proportions of water to one of the mixed powder. When boiling, the prepared skein of cotton was plunged into the solution, which was now of a deep red colour. It was turned round and round in the boiling liquid upon the extremity of a small twig held in the hand, and when dyed to the required depth it was removed and allowed to strain off the surplus liquid. Thereafter, it was washed several times and hung out to dry.

"I asked what was the use of the bark (*Alnus* 2nd), and was told that it was for deepening the colour from red to brown of the darkest possible shade. A few pieces were thrown in, and the skein of cotton prepared in my presence was treated as before, when a beautiful red brown colour was the result.

"I have gone into detail on the process of dyeing from *R. sikkimensis*, because I am assured by many distinguished authorities that it has been reported as not yielding madder dye, and because the process described seems to be known to the hill tribes of Assam and the Naga Hills only. I trust that this preliminary account may suggest the lines upon which a more thorough investigation should be instituted by the authorities in Assam, and I shall have much pleasure in identifying the auxiliaries used in other parts of the province, if I am favoured with specimens. This would enable me to perfect and complete the account of the Naga madder.

"I suspect that the bulk of the madder plant of Assam will be found to be derived from *R. sikkimensis*, instead of from *R. cordifolia*, and that a considerable proportion of the madder exported from Sikkim is derived from this plant also."

SAKUBI.—*Scientific name unknown.*

Khasi.—Sakubi

Found in the Khasi Hills and used to extract a red dye by the following process: "Take half a seer of lac and boil with water Then put in leaves of the *sakubi*, and when both are dissolved, immerse the yarn. When well steeped, take out and dry in the sun. Repeat the process three times, and the yarn will be dyed a good red" (*Darrah*). It is perhaps open to doubt whether the red is not obtained more from the lac than from the *sakubi*, in which case the *sakubi* leaves are very possibly used as a mordant.

SARCOCHLAMYS PULCHERRIMA.—*Gand.; Fl. Br. Ind.*, V, 588; *Urticaceæ*.

The Asoka Tree.

Garo.—Dkg'l.

A bush or large shrub, with a stem often as thick as a man's leg, found in Sylhet and the Khasi and Garo Hills. The twigs and leaves are used with the bark of *Albizzia odoratissima* (*q.v. supra*) to produce a madder brown.

SCHIMA KHASIANA.—*Dyer, in Fl. Br. Ind.*, I, 289.

"A tree of the Khasi mountains, found at altitudes between 4,000 and 6,000 feet. *Baillon* says that the bark of this tree is used in dyeing and in the preparation of skins" (*W. R. Clark*). I have not, however, been able to find any evidence of its being so used at the present time.

SEMECARPUS ANACARDIUM.—*Linn. f.; Fl. Br. Ind.*, II, 30; *Wight, Ic.*, t. 538.

The Marking-nut Tree

Beng.—Bhela, Bhelatuka.
Ass.—Bhalaguti.
Garo.—Bowatue.

"The black acrid juice of the nuts is used largely to mark cotton garments. The colour is improved, prevented from running, and fixed by a mixture of quicklime and

water" (*Darrah*). The only district which has reported its use is Nowgong, where *dhobis* are said to use the juice obtained by pricking the fruits, to mark clothes given to them to wash.

SESAMUM INDICUM.—*D.C., Fl. Br. Ind., V*, 387, *Wight, Ill., t.* 163, *Pedalineæ.*

GINGELLY, OR SESAME OIL

Beng.—Til.
Ass.—Til.

Found all over the plains of the province, but, like *Ricinus communis* (castor-oil plant), the oil is not used in dyeing in Assam.

SHOREA ROBUSTA.—*Gærtn*; *Fl. Br. Ind., I*, 306; *Beddome, Fl. Sylv, t.* 4.

THE SAL TREE

Beng. and Ass.—Sál (resin = ral, dhuna)
Garo.—Bolsal

This tree is found in the Lower Assam Valley and in Goalpara. Its bark is a valuable tan, but the tree is not used for dyeing in the province.

SONGLUNG.—*Scientific name unknown.*

Ao Naga—Songlung
(*Vide* under "*Tanuht.*")

SPONDIAS MANGIFERA.—*Willd; Fl. Br. Ind., II*, 422, *Wight, Ill.*, 186; *I, t.* 76.

THE HOG PLUM

Ass.—Amara.

A small deciduous tree, found in all the plains districts, the bark being used with that of the *uddhuriá*, or guava (*Psidium guajava*), to produce a black.

STROBILANTHES FLACCIDIFOLIUS.—*Nees.; Fl. Br. Ind., IV*, 468.

THE RUM OR ASSAM INDIGO PLANT.

Ass.—Rúm (the plant), Rúmpát (the leaves)
Manipuri—Khuma, Khum, Kum
Phakial—Khom, Hom
Angami Naga—Sapro, Japur, or Chapur
Sema Naga.—Ahatsopú.
Lhota Naga—Chimohu
Khamti—Tonhem, Tonkham, Romgás
Mikir—Chibu, Lotárang, Rangápát
Kachari—Nih.

The use of this plant in dyeing in Assam has been very fully described in the "Dictionary of the Economic Products of India," and it will suffice to refer to that publication for the history of the plant, and for its use by the Manipuris and Khamptis. I have received the following additional information from Manipur, on the use of the plant for dyeing *silk*. Warm gently four seers of fresh *kum* leaves in eight seers of water; this quantity of water in an ordinary earthen *kalsi* will suffice to submerge the leaves an inch below the surface of the water. The water should never be allowed to get too warm to allow one to dip a finger in it without pain. In about 20 minutes the upper part of the water will be quite blue. The pot is then taken off the fire and allowed to cool down; when merely tepid, the liquid is poured off into another vessel. The silk, previously cleaned as described above (*vide* under "*Bixa orellana*"), is then placed in this second

vessel and squeezed about and rubbed in the liquid until it is cold; this liquid is then thrown away; and the silk subjected four or five times to the same process in fresh supplies of it, until it has assumed the desired shade of blue. It is then washed gently, and exposed to dry in the sun by affixing a bar of wood at each end and allowing one end to hang so as to stretch the silk out taut. The result is a blue called by the Manipuris *hikok*. To dye *silk* black (Manipuri = *amuba*), it is first subjected to the above process; then the leaves of the *chingjagu*, teak tree (*Tectona grandis*), are pounded up and soaked for 24 hours; the decoction is then strained through a coarse cloth. The bark of the *kuhi* (*Quercus fenestrata*) tree is then pounded and soaked for 24 hours. The decoction so obtained is mixed with the teak leaf decoction in the proportion of 1 to 3, and the silk, dyed blue as above, is boiled in the mixture for half an hour. It is then taken out, cooled, washed clean, and dried in the sun. It is then rubbed and squeezed about in a fresh *kum* decoction, prepared as above, for half an hour, and again dried in the sun. The result, as stated, is a black (*amuba*).

In the plains districts of the province, the plant is in very general use, and yields a blue, a black, a purple, and a green dye. In Lakhimpur, the leaves and the tender stalks are mashed up and soaked in water for three or four days, by which time the water becomes black. When black, it is poured off, and the thread, etc, is boiled in it for two or three hours and then exposed in the sun. This process is repeated three times and produces a black. In the Sibsagar district, *Darrah* says—"The plant is broken up and boiled with the cloth, which has been previously steeped in country liquor.* If lac dye is added to the solution, a handsome purple colour is produced, whilst if mixed with the bark of *tepur* (*Garcinia xanthochymus*) and the leaves of *bhomrati* (*Symplocos racemosa* or *grandiflora*) as a mordant, a green colour is the result." The Noras and Turungs in the Amguri mauza of the Jorhat subdivision adopt the following process: The leaves and twigs are gathered in September or October, and steeped in water in a large *charu* or earthen pot. After four days, the contents are thoroughly stirred and allowed to remain in the pot for two days more. The leaves and twigs are then squeezed and removed from the water, which by this time assumes a light blue colour. The liquid is then strained through a *kharáhi* or bamboo sieve. Lime is then put in in the proportion of 1 to 15 or 20 of the weight of the liquid, and the whole is stirred up with a scoop, usually made of the rind of the bottle-gourd, until the surface of the liquid is covered with froth. The froth is dissipated by sprinkling mustard oil on it. Next day, the sediment is carefully removed and preserved, the liquid being thrown away. The sediment can be preserved for a considerable time without its efficacy becoming impaired. Ash water or *khárpáni* (*vide* under "*Musa sapientum*") is then prepared, and six seers of it mixed with a seer of the dye sediment and half a seer of *madh* or rice-beer. The mixture is allowed to stand all night. Next day, the vessel containing it is placed in the sun and the cloth or thread to be dyed placed in it. At the end of half an hour it is taken out, gently wrung out and dried in the sun. This is repeated five or six times a day for three or four days, the liquid being replenished if necessary. The cloth or thread then assumes a dark blue colour. This process applies only to cotton articles, and is not suitable for silk or woollen articles. The cloth so dyed is generally used for women's *mekhelas*. A permanent green is obtained as follows: The cloth to be dyed is put into a vessel with pounded turmeric and water and kept there, ready. The leaves of the *ním* plant are then boiled in a vessel, which may be either earthen or metal. On the first boil, the vessel must be taken off at once and the leaves removed immediately—otherwise, the water becomes black and is useless. The cloth is then taken out of the turmeric decoction and placed in the other vessel as soon as the leaves have been removed from it, and allowed to remain there till the mixture is cold or nearly so. It is then taken out, wrung out, and dried in the sun. The whole process may have to be repeated according to the depth of colour required, fresh leaves being used each time. The result is a green, which is said to be very fast, and to be undimmed by constant washing.

In Nowgong, the process is reported to be much the same as that in Jorhat, which has been described above; except that no mustard oil is used, and the colour resulting is said to be black. The Mikirs in the Darrang district allow the leaves to get quite

* By this is probably meant, not liquor prepared from *mhowa* or molasses, but *madh*, or rice-beer.

dry in the sun, pound them into dust, and mix the dust with some vegetable potash. This mixture is steeped in water and the cloth to be dyed is boiled in it and dried three times The result is a black. Two specimens were sent me from Golaghat: they were called by the Mikirs on the Nowgong border "*Rangápát*" and "*Lotá rang.*" It is said that the leaves of both are bruised and boiled together, and the cloth then dipped in the resulting dye. After two or three dippings, the cloth assumes a medium-coloured dirty blue, and after six or seven dippings a dark navy blue. Another method of using the leaves is to keep them till they are rotten, and then mix them with ashes and cold water. The leaves so treated do not require to be boiled, and the colour resulting is the same. The Mikirs say that these two plants can be used separately, but that the dye produced, though of the same colour, is less efficacious, and that a cloth in consequence requires to be dipped more frequently before the dyeing operations are complete. This is interesting, for there is room for a suspicion that there are two or three widely different plants used, all of which have been assumed by most observers to be the same. The specimens in the present case were unfortunately so badly prepared as to preclude the Reporter on Economic Products from distinguishing between the two, though he thought *Rangápát* was *S. flaccidifolius.*

In Sylhet, the leaves are boiled in water with turmeric juice for an hour. The cloth is dipped in the decoction and dried in the sun. After three dippings, a green is obtained. (See also under "*Indigofera tinctoria*" and "*Kalapát.*")

SYBOO.—*Scientific name unknown.*

Khasi.—Syboo.

"If the yarn be soaked for a day in a solution, three days old, of washed leaves of the *syboo* and wood ashes, it will be dyed black" (*Darrah*).

SYMPLOCOS CRATÆOIDES.—*Hamilton; Fl. Br. Ind., III,* 573; *Styraceæ.*

A large shrub or small tree found in the Khasi Hills. The bark and leaves can be used in dyeing, and yield a yellow colour; they are principally used elsewhere in combination with madder, which is also found in the Khasi Hills; but I have not been able to discover that the Khasis used them at all in dyeing.

SYMPLOCOS GRANDIFLORA.—*Wall.; Fl. Br. Ind., III,* 578.

Ass.—Bhomrati.
Phakial.—Moitsum.

[*Note.*—This tree, *S. Racemosa*, and *S. spicata*, are all known to the Assamese and Phakials by the same names The account below of the uses in dyeing of *S. grandiflora* must, therefore, be taken as applicable also to *S. Racemosa* and *S spicata*, for all the accounts I have received refer to these trees by their vernacular names only.]

A small tree, indigenous to the forests of Assam. Its leaves are one of the commonest mordants used in the province. For the dyes with which it is used, see the accounts given of "*Bixa orellana*," "*Coccus lacca*," "*Garcinia xanthochymus*," "*Rubia cordifolia*," and "*Strobilanthes flaccidifolius.*"

SYMPLOCOS RACEMOSA.—*Roxb.; Fl. Br. Ind, III,* 576.

THE LODE OR LODH TREE.

Beng.—Lodh.
Ass.—Bhomrati.
Manipuri.—Kairang.
Khasi.—Lúpongdong.
Mech.—Bhaira.

(See under "*S. grandiflora.*")

SYMPLOCOS SPICATA.—*Roxb.; Fl. Br. Ind., III.*, 573.

Ass.—Bhumrati.

Phakial—Moitsum.

(See under "*S. grandiflora.*")

TABERNÆMONTANA CORONARIA.—*Br.; Fl. Br. Ind., III*, 646; *Wight, Ic., t.* 477; *Apocynaceæ.*

Beng.—Tagar, Chameli.

"A small evergreen shrub, with silvery bark and glossy leaves, cultivated in gardens * * *. The red pulp obtained from the aril, or extra coat of the seed, gives a red colour, which is occasionally used as a dye by the hill people" (*J. Murray*). The shrub is reported to be found in Kamrup, Darrang, and Sylhet, but in neither of these districts is it used for dyeing. None of the hill districts report its existence or use in the Assam hills.

TAGETES ERECTA.—*Linn.; Clarke*, 142; *Compositæ.*

The French Marigold

Beng.—Genda.

This flower, though common in both valleys, and yielding a yellow dye, is not used for dyeing in Assam.

TAMARINDUS INDICA—*Linn.; Fl. Br. Ind., II*, 273; *Leguminosæ.*

The Tamarind Tree.

Beng.—Tentul.

Ass.—Teteli.

"A large handsome tree, the flowers and fruit of which are used as an astringent in dyeing, especially with safflower. It acts the part of a mordant" (*Darrah*). I cannot find in what district its use with safflower is known. The only district in which it is reported to be used for dyeing purposes is Darrang, in the sadr subdivision of which it is used as a mordant with lac (*vide* "*Coccus lacca*," also "*Kuchiatenga*").

TAMARIX DIOICA.—*Roxb.; Fl. Br. Ind., I*, 249.

The Tamarisk.

Beng.—Laljhan.

Found in Sylhet, but not used for dyeing purposes.

TAMARIX GALLICA.—*Linn.; Fl. Br. Ind., I*, 248.

The Tamarisk.

Beng.—Jhav-jhau.

Found in Sylhet, but not used in dyeing.

TANGSHI, OR TANSI.—*Scientific name unknown.*

Ao Naga.—Tangshi.

The following extract is taken from a letter from the Rev. E. W. Clark on the subject of the dyeing customs of the Ao Nagas: "There is a red dye, but it is said not to be found in the Ao country. It is brought by traders from across the Dikhoo river. It is said to be a red woody vine, seldom larger than a man's finger; it is cut up, bound in little bundles, and sold to the Aos; it is kept in some dry place in their houses. For use it is well dried, so as to be brittle, and is then pounded fine in a mortar by a pestle. When thoroughly pulverized, it is ready for use. Some *tanshi* tree leaves are first cooked in water; these leaves are removed, and some fresh bark of the *songlung* tree is pounded and then cooked in the same water; this bark is removed, and the pulverized red dye is well cooked for some time in the mixture. Afterwards submerge and soak in this water the yarn or long hair of goats or of dogs that is to be coloured red. The *tanshi* tree may grow to be somewhat large, bears fruit, in clusters like grapes, of a light yellowish colour when ripe, and each fruit about one inch in diameter. The *songlung* tree is said never to attain a large size; when mature, the trunk is only a few inches in diameter."

TAXUS BACCATA.—*Linn.; Fl. Br. Ind., V*, 648; *Coniferæ.*

THE YEW.

Beng—Burmic.

Khasi.—Dingsableh.

This tree yields a red dye. It is found in the Khasi Hills, but is not used for dyeing.

TECTONA GRANDIS.—*Linn.; Fl. Br. Ind., IV*, 570; *Verbenaceæ.*

THE TEAK TREE

Beng—Segun.

Ass—Segun.

Manipuri.—Chingjagu

The leaves are said to yield a red or yellow dye, but are not used for this purpose in Assam. In Manipur, the leaves are used with the bark of *Quercus fenestrata* to produce a black (see under "*Quercus fenestrata*").

TERI.—*Scientific name uncertain.*

Sylheti.—Teri.

I was inclined to think this was the *Cæsalpinia sappan*, from the use made of it. The leaves (unfortunately only a very defective specimen was procured) were sent to the Reporter on Economic Products to the Government of India for examination, and he was inclined to think they were those of *C. digyna*, and not *C. sappan*. The tree is found in Sylhet, and is there used with sulphate of iron, *Terminalia belerica* and *Terminalia citrina* or *chebula*, to produce a fast ash-coloured dye (*vide* under "*Cæsalpinia*" *supra*).

TERMINALIA ARJUNA.—*Bedd.; Fl. Br. Ind., II*, 447; *Combretaceæ.*

THE ARJUNA MYROBALAN.

Beng—Arjuna.

Ass.—Orjun.

This myrobalan is found in the Assam Valley, but, though occasionally used medicinally, it does not appear to be used in dyeing.

TERMINALIA BELERICA.—*Roxb.; Fl. Br. Ind., II,* 445.

BELLERIC MYROBALAN.

Beng.—Bahera, Baheri.
Ass.—Halluch, Bauri.
Garo.—Chirorœ.

The fruit is used as a mordant, chiefly in the Surma Valley. The only account I have received of its use is in Sylhet, where it is used with *Cæsalpinia* (*sappan* or *digyna*), iron sulphate, and *T. chebula* to produce an ash colour on cotton and wool.

TERMINALIA CATAPPA.—*Linn.; Fl. Br. Ind., II,* 444; *Wight, Ic., t.* 172.

INDIAN ALMOND.

Beng.—Bángla-bádám.

Found in Sibsagar, but not used in dyeing.

TERMINALIA CHEBULA.—*Retz.; Fl. Br. Ind., II,* 446.

THE CHEBULIC OR BLACK MYROBALAN.

Beng.—Haritaki.
Ass.—Hilikha, or Silikha

[*Note.*—*T. citrina* has been regarded as doubtfully a distinct species from *T. chebula*. At any rate, in Assam both are known by the same name, and I have not attempted to distinguish between them.]

This is one of the most valuable mordants known in India, and is very common in all the plains districts of the province. It is generally used in recipes for obtaining a black. For the ingredients with which it is mixed, see the accounts under "*Bixa orellana*," "*Bharali*," "*Coccus lacca*," "*Eugenia jambolana*," "*Loranthus pentapetalus*," "*Mangifera Indica*," "*Mithá ám*," "*Phyllanthus emblica*," "*Psidium guaiava*," and "*Teri*."

TERMINALIA CITRINA.—*Roxb.; Fl. Br. Ind., II,* 446.

Beng.—Haritaki.
Ass.—Silikha, Silika or Hilika.
(See under "*T. chebula.*")

TERMINALIA TOMENTOSA.—*Bedd.; Fl. Br. Ind., II,* 447.

THE ASNA OR SAJ TREE

Beng.—Ashan.
Ass.—Amari.

I have not been able to ascertain in what part of the province this tree is found. But *Darrah* says, in his "Note on Cotton in Assam," that "the bark, cut up into small pieces and boiled for six or eight hours, gives a brown dye. It gives a black dye with iron."

TODDALIA ACULEATA.—*Pers.; Fl. Br. Ind., I,* 497; *Rutaceæ.*

Beng.—Kada-todali.

The root-bark of this tree yields a yellow dye. The tree is found in the Khasi Hills, but is not used for dyeing.

RAPA BISPINOSA.—*Roxb.; Fl. Br. Ind., II,* 590; *Onagraceæ.*

THE SINGHARA NUT.

Beng.—Paniphal.

Ass.—Singari.

Common on the tanks and pools of the plains districts. "The ground fruit is employed in certain parts of the country for making the red *gûlal* powder used during the hali festival" (*F. Murray*). I have not been able to discover that it is so used in Assam.

VIGNA CATIANG.—*Endl.; Fl. Br. Ind., II,* 205; *Leguminosæ.*

THE CHOWLLE OF INDIA.

Beng.—Shim.

Ass.—Urohi mah.

Urohi maharpat (*Vigna catiang, Endle*), is said to yield a green dye. The process has been thus described: Place a quantity of the leaves of the *rûm* (*Strobilanthes flaccidifolius*) in an earthen vessel full of water, and, having tied up the mouth, allow the vessel to stand for three or four days, or until the leaves rot. Then take out the rotten leaves, squeezing all juice out of them in so doing, and shake the liquid left behind well for some time. Then tie up the vessel once more and let it stand for the night. Next morning pour off any watery fluid that may be found, and add to it one-fifth the quantity of ash water (called *kharani* in Assamese, and made by filtering water through wood-ashes), one-tenth the quantity of native liquor, and one-twentieth the quantity of the juice of the *thekra* (*Ixora acuminata*). Then place the mixture in the sun for three consecutive days, after which the material to be dyed should be dipped into the liquid and squeezed out and sun-dried, this process being repeated for three days. Then place in a mortar *urohi* leaves 4 parts, *turmeric* 1 part, and *thekra* leaves 2 parts. Crush the whole well, and after rubbing the pulp so formed well into the cloth dyed as above with the *rûm*, leave the whole cloth and pulp to steep for the night. Next morning squeeze the juice out of the material, and dry in the sun. The process should be repeated till the desired shade of green has been obtained. The leaves of the plum tree are said to answer as well as those of the *urohi maharpat*. There is another method of producing the dye, in which lime-water is used instead of ashwater, the rest of the process being identical with that described above.

VITEX NEGUNDO.—*Linn.; Fl. Br. Ind., IV,* 583; *Wight, Ic., t.* 519.

THE SAMBAL.

Beng.—Samalu, Nishinda, Nirgandi.

The ashes form a useful alkali in dyeing; but, though found in the Sibsagar, Goalpara, and Lakhimpur districts, the plant is not used for this purpose.

WEDELIA CALENDULACEA.—*Less.; Fl. Br. Ind., III,* 306; *Wight, Ic., t.* 1107; *Compositæ.*

Beng.—Kesarája Bhimráj.

Ass.—Kehraj.

Common in the Assam Valley and in Sylhet. The leaves are used in Darrang to dye grey hair black and to promote the growth of the hair. They are also used in dyeing in Sylhet, but the method of use has not been ascertained.

WENDLANDIA TINCTORIA.—*D. C.; Fl. Br. Ind., III*, 38.

Beng.—Tula-lodh.

"The bark is used as a mordant in dyeing by the Nagas and other hill tribes in the province" (*Darrah*).

WRIGHTIA TOMENTOSA.—*Roem, etc.; Schults.; Fl. Br. Ind., III*, 653; *Wight, I, t.* 443, 1296.

Beng.—Dudh koraiya.

Ass.—Atkuri.

"Every part of the tree discharges a yellow, milky juice on being wounded," which yields a fairly good yellow dye, but is not used as a dye in Assam.

XANTHIUM STRUMARIUM.—*Linn.; Fl. Br. Ind., III*, 303; *Compositæ.*

Bur Weed.

Beng.—Ban okra.

Ass.—Agara.

The leaves yield a yellow dye. The herb is found all over the Assam Valley, but is not used for dyeing purposes.

GLOSSARY OF VERNACULAR NAMES OF DYES.

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